



Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers

Volume 21, No. 5

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Monitoring Times

Understanding the HF Ham Bands



Also in this issue:

Radio Shack PRO-2053 review

Spy Software: What can you do?

Sports Scanning

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Monitoring Times

Vol. 21, No. 5

May 2002



Lead Story

Who's Who in the Spectrum: Amateur Radio

By Larry Van Horn

The shortwave bands are filled with all kinds of signals – foreign broadcasters, aircraft, ships, military communications, data signals, and all kinds of two-way conversations. The latter are most likely to be amateur radio operators, enjoying and practicing the skill of shortwave communications.

The amateur radio service is allocated frequency blocks throughout the spectrum, but the focus in installment five of our radio spectrum series is on the HF bands. The HF amateur bands are further divided in terms of who may operate where and what modes they may use. Monitors and hams alike will find our exclusive table of band plans to be invaluable in making sense of the shortwave radio spectrum. Story starts on page 10.

On our cover is station W1AW, operated by the American Radio Relay League for the benefit of all hams. Photo courtesy of the ARRL.

Ham Radio: More Than a Hobby 14

By Arthur Lee WF6P

There are numerous dramatic stories to be told about ham radio; this isn't one of them. It's an account of how a youthful attraction to radio was finally realized, and how ham radio is now woven into the very fabric of the author's life, family, and relationships.

The Pirate Hams of Forty-five 16

By Finbarr O'Driscoll

If you ever doubted it, this article proves that people are everywhere the same: If there's something illegal to do, someone will want to do it. If you are in Europe, you'll find a number of interesting characters conducting ham-type operations on 45 and 85 meters – areas designated for aeronautical use. Who are they? Where are they from? Why do they do it? It's all speculation, of course.

Road Trip: Massachusetts to Dallas 20

By John Mayson

In part two of our marathon trip, we continue through Tennessee and Arkansas on Interstate 40, then pick up Interstate 30 to our destination in Dallas. With his scanner as a companion, Mayson logs the public safety frequencies of most interest to the traveler.



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Reviews:

The Radio Shack PRO-2053 is a trunk-tracking, desk top scanner made by GRE. Parnass says, if you don't require CTCSS or DCS squelch or LTR trunking, it is a cost-effective alternative to the PRO-2067 (see p.80).

A base station for Family Radio Service? Nifty idea, says Jock Elliott, and Audiovox is the first one to come up with it (see p.86). The Audiovox FRS-1000 includes weather radio, provides outstanding performance, and is affordable.

Spy software can turn your own com-

puter against you, especially if you are connected to the internet. Even if the intent is not malicious, companies may be gathering personal information you have not authorized. Ad-Aware is one software package which can help detect and remove suspected spy software, and John Catalano puts it through its paces (p.82).

For those traveling around Quebec, a new CD from Gilles Thibodeaux provides a wealth of information for the scanning hobbyist and ham radio operators (see p.87).

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Commercial Use of Ultra-wideband Technology Approved

"Since there is no production of UWB equipment available, and there is little operational experience with the impact of UWB on other radio services, the commission chose...to err on the side of conservatism by setting emission limits when there were unresolved interference issues." ...from FCC press release.

On February 14th, the FCC voted unanimously to approve scaled-down use of ultra-wideband (UWB) technology for handheld wireless communications, ground penetrating radar, vehicle collision avoidance systems and short-range, high-speed data transmissions. The technology will be used on an unlicensed basis.

UWB works across a wide band of spectrum, transmitting a series of narrow and low-power pulses which are undetectable by conventional radios. With appropriate technical standards, UWB devices can operate using spectrum occupied by existing radio services without causing interference, thereby permitting scarce spectrum resources to be used more efficiently.

The FCC's *First Report and Order* includes standards designed to ensure that existing and planned radio services, particularly safety services, are adequately protected. The FCC said they will act vigorously to enforce the rules and act quickly on any reports of interference.

The standards adopted represent a cautious first step with UWB technology. They are based in large measure on guidelines that the National Telecommunications and Information Administration (NTIA) believes are necessary to protect against interference to vital federal government operations, especially the Global Positioning System. The NTIA is the Executive Branch agency principally responsible for developing U.S. telecommunications policy.

What is Ultra-wideband?

Ultra-wideband is a digitally enhanced radar technology that enables users to transmit encrypted voice and radar signals simultaneously, using short bursts of radio waves. UWB is a form of spread spectrum in that it radiates RF energy over a very wide swath of frequencies. Much of the early work in the UWB field (prior to 1994), particularly in the area of impulse communications, was performed under classified U.S. Government programs.

UWB is looked upon as an answer to the wireless industry's most pressing problem ...the

lack of unallocated radio spectrum. UWB operates within frequencies already allocated to other uses, but by using millions of pulses each second spread across a wide band they emit extremely little energy on any specific frequency.

UWB can transmit large amounts of data over the air with relatively little power. UWB's power requirement can be 1/10,000th as much as that of a cell phone. A big advantage is that battery consumption is far less for mobile and handheld devices. And UWB systems are relatively low cost.

Backers of UWB said the new technology, with some safeguards, is harmless enough to come under the FCC's existing Part 15 rules which apply to unintentional emitters of radio frequencies. Not all agreed, especially the Dept. of Defense and wireless operators.

Notice of Proposed Rulemaking

In May 2000, the FCC issued a *Notice of Proposed Rulemaking* proposing the use of UWB on an unlicensed basis. Huntsville, Alabama-based Time Domain Inc., one of the major ultra-wideband players, also received a waiver last year from the FCC to produce 2,500 RadarVision motion detector devices which can see through walls to report the location of people.

Police and firefighters are interested in UWB technology because it can allow them to determine if people are on the other side of the wall in a burning building or in a hostage situation. Another possible use of a solids-penetrating radar system is to find survivors after earthquakes and other disasters. Last year, the FCC granted temporary permission to use ultra-wideband devices to locate victims of the World Trade Center collapse.

US Radar Inc., and the Zircon Corp. were also granted exclusive waivers to begin marketing UWB devices on a limited basis to test their safety and effects. US Radar concentrated on surface-penetrating pulse radar to locate land mines and artifacts. Zircon is perfecting a high-tech stud finder for use by concrete and high-way contractors.

NPRM commenters opposed to the technology say that it can interfere with existing communications. The pulses in ultra-wideband are spread across spectrum used by wireless carriers, the airlines, TV broadcasting, satellite channels, the military ...and ham radio. Global positioning by satellite (GPS) users were espe-

cially worried that UWB radios would cause interference by raising the overall noise floor.

Time Domain maintains that UWB signals are undetectable, even at short range, by a receiver not designed to receive ultra-wideband signals, because the pulses are sent at sub-milliwatt power levels and the energy is spread across a huge range. They say the emissions do not even exceed those of consumer hair dryers and other household appliances and do not pose a safety threat by blocking other communications.

The general consensus is, however, that more testing needs to be done before new UWB products are released on the market. An Ultra-wideband Working Group has been formed, consisting of 80 companies pledging to work together to ensure the safety of the technology.

FCC approves UWB technology

In the February 14th Order, the FCC elected to restrict UWB devices to spectrum bands above 3.1 Gigahertz, well above the 1.6 GHz range used by GPS and military communications systems. The FCC also imposed severe restrictions on the power UWB applications may use and spurious emissions emitted from UWB devices must be carefully contained.

The FCC's decision was welcomed by several companies hoping to use the technology to link devices in the home and office like telephones, televisions, entertainment systems and digital cameras. But the power level approved was a thousand times less than wanted by some UWB marketers. In some cases, the FCC restricted use to law enforcement, scientific researchers, the medical profession, and certain industries like construction firms.

The FCC explained the limitations were to dispel the fear that UWB's powerful signals would interfere with GPS and military operations or broadcasts from television and radio stations.

The "Radar Vision" equipment Time Domain built under that FCC waiver will have to be redesigned. The existing products they have now won't be legal to operate under the new rules. On the web see: <http://www.timedomain.com>.

While industry believes the new UWB rules are too restrictive, the Dept. of Defense called the FCC's UWB ruling a "reasoned and balanced approach" of protecting critical na-

continued on page 83

The Future and the Past come together on your computer!

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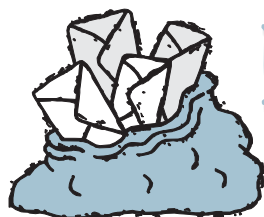
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LETTERS TO THE EDITOR

Hobby Holiday

With vacation days coming and the timing right in between deadlines, I treated myself to a trip to the 15th Annual SWL Winterfest in March.

For a great opportunity to meet experienced shortwave and scanner listeners – not to mention hams and satellite buffs – this event can't be beat. More than 200 hobbyists showed up in Kulpville, PA, to listen to speakers, ask questions of shortwave broadcasters, exchange ideas, see a live SW broadcast, take their chances at the raffle, and have an all-around good time.



It's nice to be able to put faces to the names seen so frequently in the hobby, especially in the *NASWA Journal* (the sponsoring organization) and in *Monitoring Times*. Pictured is your editor in between Fest organizers Richard Cuff and John Figliozzi. For information on the SWL Winterfest, past and future, and more pictures, visit <http://www.swlfest.com>.

Channel Islands History

I am a shortwave operator, and I enjoy reading your *Monitoring Times* publication.

Further, I am a WW2 Naval Veteran of the European Theater. This is a true story, concerning what shortwave radio and transmission meant to English people that were held captive from 1942 thru May 1945 on the Channel Islands which are located off of Normandy, France, in the English Channel. I have visited these islands and this history was given to me from people that lived through this period in England and on the Guernsey and Jersey Islands.

In very early 1942, Adolph Hitler placed

22,000 German troops on these islands, with the prime purpose of invading England and controlling the waters in this area of the English Channel. He called them his Isle Fortress. With slave labor from France, Italy, and North Africa, he began to build his fortress with a railroad system, gun emplacements, howitzers, underground heating system for a hospital intended for the German troops in France, and tunnels that he built from the Port of Guernsey.

He did give the local residents an opportunity, if they wished, to move back to England, but this was allowed for only a very short time. During this occupation, the natives had no way of communicating with their families that went to England, so they began to use shortwave radio. The Occupational forces did not approve of this, so every time they found a home that had a shortwave system, they immediately took it from them, but they were not able to confiscate all of the radios. [*I assume he means ham radio, though it may have been homebrew-ed.*]

In 1943, Adolph Hitler moved a lot of the families off of the smaller islands, for better control. A number of people were arrested and served some jail time. One story from 1943 tells of a lady who addressed a German soldier by saying, "Heil Churchill," instead of "Heil Hitler." She was sentenced to serve in prison in Caen, France, for two years.

Adolph Hitler tried his best to have his occupational forces maintain a good relationship with island natives. He employed native labor and paid a wage, and gave them certain freedoms, but all of this came to a end when the Allied Forces invaded France on June 6, 1944. Suddenly this army of 22,000 men was captive, and they all remained on the islands until May 1945.

The Channel Islands were known for their farming and fishing, but everything else was imported. Since they could no longer bring in supplies, German forces and natives alike were put on a ration program, including fresh water; anyone wishing to fish had to get special permission. For nearly a year they were no longer able to obtain basic necessities, and lived on rations and what they grew in their farms and hid from the German Forces. Life was not pleasant for either the Germans or the natives, but they got along pretty well.

In May 1945, British and American Forces came to Guernsey and surrender documents were drafted up. A convoy of 10 LST U.S. Navy and a good number of British vessels loaded with food, water, medicine and clothing from England arrived at Guernsey. All of the 22,000 German Forces were then Prisoners of War and taken to England for the duration of the war.

The bottom line is, from 1942 through 1945 shortwave radio was the only method to communicate with the outside world. Adolph Hitler was in the process of building a communication system, but never finished.

I sincerely hope that all Ham operators appreciate this piece of history; I would welcome any QSL cards they would be willing to send.

Edward J Dyar
6075 Darramoor Rd
Bloomfield, Mich 48301

Our Compliments to the Staff

"Gary Webbenhurst's *Getting Started - Bright Ideas* are pointed, factual, practical, specific, and able to be implemented by others. His advice makes your magazine worth much more than the subscription price. Please encourage all your columnists to emulate Gary Webbenhurst."

— Maury Midlo

"I am Chief Warrant Officer Bill Stocke, from a naval vessel forward deployed in support of Operation Enduring Freedom. A couple of days prior to the ship's departure, I picked up my first *MT* magazine. My intentions at first were to use the magazine for communications security training for the ship's Officers. But after that was done, I began to really read the magazine, and I must say that this is an example of a well produced publication.

"I have thoroughly enjoyed every article and can not wait to return to the states so I can begin a subscription. Keep up the good work,"

— W. R. Stocke, CWO2, USN

"Just a note to say how much I enjoy the *Monitoring Times*. I just wish that our (UK) magazine was half as interesting."

— Alan Burnett-Provan

[To Kevin Carey, *Below 500 kHz*] "Just a short note to tell you I purchased a LaCross radio controlled clock after reading about it in your March 2002 column in *MT*. I have been looking for such a clock for some time and this one has just the features I have been looking for. It has been in use here for several days now and I fully agree with your assessment on all counts. Thanks for sharing your find with your readers."

— Steve Lord



Winterfest banquet; Kim Elliott from Voice of America, speaker. Photo Credit: Tom Sundstrom

SWLing the Amateur Bands

A while back, in the October 2001 issue of *MT*, we ran an article on QSLing the amateur radio bands. Since we are featuring ham radio this month, it's a good time to pass along these additional resources sent in by Allan Rosewarne N9SQT/WDX6HQV.

For incoming QSLs to shortwave listeners (SWLs), besides the Amateur Radio Relay League card manager Mike Witkowski in the U.S., "there is the International Listeners Association, a radio hobby group that emphasizes listening on the amateur radio bands. Their address is at ILA, 1 Jersey Street, Hafford, Swansea, SA1 2HF, UK, and their website is at <http://websites.ntl.com/~gw4oxb/>

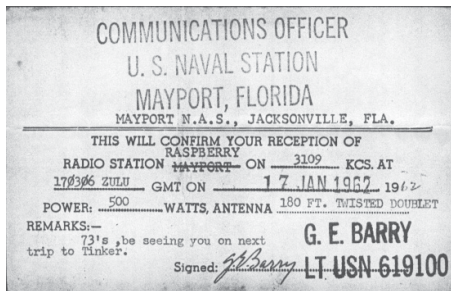
"Furthermore, the bulletin of the Canadian International DX Club (CIDX), a *Monitoring Times* advertiser, has a regular column about listening to radio amateurs. The British publication, *Shortwave Magazine*, also has a monthly column that is devoted to SWLing the ham bands."

— Allan Rosewarne N9SQT/WDX6HQV

Old Data Brought to Life

"Enjoyed your right-on comments regarding some of the outdated comms information widely propagated on the Internet (February *Closing Comments*).

"You mentioned that the USN's RASPBERRY net and callsign disappeared many years ago. When I read that, I dug up my 40-year old



1962 QSL from Raspberry Mayport (3109 kHz) at the Mayport Naval Station, Florida. Yeah, I guess that information is pretty long in the tooth and eligible to be deleted from listings."

— Tom Kneitel K2AES

Readers may recognize Tom Kneitel as a long-time editor and frequent contributor to *Popular Communications* magazine.

Ironically, shortly after our February editorial, one of the callsigns listed as defunct was heard over the air:

"Looks like the callsign ALMIGHTY has risen from the dead. I know Bob Grove in one of his recent editorials laid it to rest...but lo and behold it was resurrected today:

20.890 Service Center: 2206 USB w/Almighty (possibly USN GUANTANAMO BAY CUBA) in HF radio test. Service Center then asks Almighty to test key 7 at which time they go into extended encrypted voice. Back in the clear they make ref to testing of LQA (nfi) and then go back to scan.

"I wonder if it's just a coincidence that Al-mighty is back just when Guantanamo is busy hosting a bunch of Taliban & Al Qaida "vacationers."

— Ron Perron

New Tricks for Old Dogs

"Thought most shortwave listeners would be interested in the new WWV forecast for radio propagation. First noted on March 13th 2002 with mention of space weather and radio blackouts given with R ratings at 18 past the hour on WWV. I'm sure it would be so much more helpful if the listeners had a guide to go by. It would be more understandable."

— Richard D. Hansen

Richard, check out page 9 for a rudimentary chart of the new codes. Detailed descriptions are on the internet, but it shouldn't be long before listeners are able to relate R levels to expected propagation, just as we did with the more complicated sunspot numbers and indices. Happy monitoring!

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, PO Box 98, Brasstown, NC 28902, or email mteditor@grove-ent.com. Letters may be edited for length and clarity. Happy monitoring!

— Rachel Baughn, KE4OPD, editor

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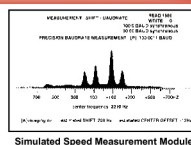
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Radio Honor Roll

Students **Brad Van Uden** and **Ted Dawson** of Los Cerritos Middle School in Thousand Oaks, California, are teaching a class on ham radio. They applied for and won a grant to teach the after-school class to a dozen fellow students who will try to earn a ham license.

It's not the first time they've won a grant. With previous grants, Brad built an antenna and Ted built a radio kit. In sixth grade, they built an AM radio. To the unknown persons who inspired Brad and Ted, and to the boys for passing it along, we say bravo!

At the SWL Winterfest, the Association of North American Radio Clubs presented the 2002 Don Jensen Distinguished Service Award to **Ralph Brandi** for helping clubs make better use of the Internet and for his efforts as part of the "Save the BBC Coalition." The "Save the BBC" website quickly became a centerpiece for the organization and gained worldwide recognition. ANARC also presented a group Certificate of Recognition to the Save the BBC Coalition.



Radio Dishonor Roll

Ronald Ferry, a hotel security guard and ex-cop, who pled guilty to lying about finding an aviation radio in Egyptian student Abdallah Higazy's room at the Millenium Hilton Hotel following the World Trade Tower attacks. The story of the arrest was widely carried by the media and Higazy was jailed for a month before investigators discovered the truth.

America's Most Wanted: Anderson and Puckett

Steve Anderson and Charlie Puckett are America's most wanted in more ways than one (See April 2002 *MT*). Once officers in the Kentucky State Militia (KSM), both are now on the Bureau of Alcohol, Tobacco, and Firearm's (BATF) most wanted list.

Anderson will also be the subject of a segment on the television show *America's Most Wanted*. This apparently was the result of efforts by the *Somerset Commonwealth Journal*. The *Journal* provided the information after growing frustrated with the lack of progress in the Anderson case. The BATF upped the reward on Anderson to \$20,000 in January. The televi-

sion program *Unsolved Mysteries* also has an Anderson segment in the works.

Anderson is best known for operating an illegal shortwave radio station known as Kentucky State Militia Radio. After discord in the KSM because of the station, Anderson was booted out of the organization, but continued to operate his station as United Patriot Radio.

In October last year, Anderson reportedly shot up a sheriff's car in Kentucky after a traffic stop. He has been on the run since and is now wanted by the BATF for attempted murder and violations of federal explosives laws.

Charlie Puckett, former commander of the



KSM, is now on the run as well. He had been released on bail following his arrest in late November by the BATF for violation of Federal firearms and explosives charges. Puckett was reportedly under house arrest with

an electronic bracelet. In mid-March, Puckett got out of the bracelet and has been on the run since. Puckett is also on the BATF's most wanted listed, with a \$5,000 reward for information leading to his arrest.

Before he fled, a statement attributed to Puckett was issued. It states that "I must leave society at this time for my own safety. . . I have broken no laws, nor have I violated anyone's freedoms."

In the days after Puckett's flight, rumors swirled that this marked the end of the KSM. This seems not to have been the case. In addition to the KSM website (<http://www.kentuckystatemilitia.com>), the Eastern Regional Patriots net is a good spot to monitor further developments. Try on or about 3860 kilohertz lower side band nightly at 8 p.m. Eastern (0000 Universal Time).

— Hans Johnson

Pentagon's Top Cuba Expert Pleads Guilty

Ana B. Montes, an intelligence analyst who was the Pentagon's top expert on Cuba, pleaded guilty to an espionage charge, admitting that she spied for the Cuban government for 16 years because she opposed United States policy toward Havana.

Ms. Montes acknowledged in Federal District Court that she had revealed the identities of four American undercover intelligence officers and provided the Cuban authorities with reams of other secret and top-secret military and intelligence information.

She was not paid for her efforts, lawyers in the case said, and was just reimbursed for some travel expenses.

Merlin Involved in Launch of Envisat

Merlin Communications has played a key role in the launch and early orbit phase of Europe's largest and most sophisticated satellite "Envisat." The satellite, launched on March 1st, is the most advanced satellite ever built to monitor the Earth's environment.

Merlin operates and maintains The European Space Agency's (ESA's) satellite tracking station in Kourou as part of a five-year maintenance and operations services contract.

The Envisat satellite will send back information on environmental changes, including global warming, natural catastrophes and ozone layer depletion. The data provided by the satellite, which will remain in orbit 800km above the earth for five years, will enable governments to take more informed decisions on tackling global climate change issues.

— Association of International Broadcasters

WWV Propagation Format Change

On March 12th, the format for propagation forecasts aired by WWV and WWVH was completely redesigned to express observed and expected conditions in terms of the National Oceanic and Atmospheric Administration's Space Weather Scales. You can find examples of the new format at <http://www.sec.noaa.gov/Data/info/WWVdoc.html#samples>.

Following is an abbreviated summary of the NOAA scales, because, until we get used to them, references to R1, G2, S2, etc., will otherwise be meaningless. For the detailed description of each level, go to <http://www.sec.noaa.gov/NOAAscales/>



May 4: Cedarburg, WI

Ozaukee Radio Club 24th Annual Swapfest 8a.m. to 1p.m. at Circle-B Recreation Center, Hwy 60 and Co Hwy I. Admission \$4. Talk-in 146.97/37 PL 127.3. Food and refreshments. License exams 9a.m. For information check web site <http://www.qsl.net/org> or phone 262-377-6792.

May 17-19: Dayton, OH

51st Dayton Hamvention, the world's largest amateur radio gathering and trade show, held at Dayton's Hara Arena Complex (1001 Shiloh Spring Rd, Trotwood, OH); Talk-in 146.940 (-600). Forums, 500 inside exhibit spaces, HUGE 2500+ space outdoor vendor area, "If you can't find it at Dayton, you'll never find it!" Hamvention's 2002 theme is Emergency Communications/Public Service.

May 18: Seal Beach, CA

Southern California Area DXers (SCADS) meeting: AM BCB DXing — Tari Livingston-Hughes speaker. Check <http://www.ocnow.com/community/groups/radiocommunications> for updates.

NOAA Space Weather Scales

Geomagnetic Storms	Solar Radiation Storms	Radio Blackouts	Descriptor
G5	S5	R5	Extreme
G4	S4	R4	Severe
G3	S3	R3	Strong
G2	S2	R2	Moderate
G1	S1	R1	Minor

Refarming the Novice CW Bands

Now that the Federal Communications Commission is no longer issuing Novice licenses, the Amateur Radio Relay League on a Petition for Rule Making filed March 22nd, asking the FCC to eliminate the 80, 40 and 15-meter Novice/Technician Plus CW subbands as such and to reuse that spectrum in part to expand the phone allocations on 80 and 40 meters. The ARRL cited underuse of the Novice bands, overcrowding on popular HF bands, and advancement in the use of digital techniques such as PSK31 to bolster its assertion that a refarming plan "cannot wait longer and must proceed now."

If the FCC approves the plan, current Novice and Technician Plus (ie, Technician with Element 1 credit) licensees would be permitted to operate on the 80, 40, 15 and 10-meter General-class CW allocations at up to 200-W output. For General and higher class operators, the ARRL wants the FCC to implement changes in the 80, 40 and 15-meter "phone" bands.

On 80 meters (3500-4000 kHz) Extra and Advanced operators would gain an additional 25 kHz and another 50 kHz for Generals. On 40 meters (7000-7300 kHz) Extra and Advanced operators would gain an additional 25 kHz for and another 50 kHz for Generals. On 15 meters (21,000-21,450 kHz) there would be no change for Extra and Advanced operators but it would mean another 25 kHz for Generals. On 10 meters, the ARRL recommended no changes other than to accommodate CW, RTTY and data by Novice and Tech Plus licensees over the 28,000-28,300 kHz segment.

ARRL pointed out that, at a time of heightened concern for homeland security, "The ubiquitous communications systems installed and maintained by radio Amateurs are always functional, and Amateur operators consistently and reliably volunteer in emergencies and disaster relief."

Cell-phone shields bunk, says FTC

The Federal Trade Commission has brought charges against two companies for unsupported claims that their product can block up to 99 percent of the radiation from cellphones and prevent electromagnetic waves from entering the brain, etc. The FTC said shielding products that block only the ear piece are ineffective. They may even make the problem worse by interfering with the signal and forcing the phone to emit more energy to establish a signal.

The FTC recommends consumers wishing to limit exposure should use a hands-free head-

set, limit usage, and avoid using cellphones where the signal is weak.

The FTC names Stock Value 1 Inc and Comstar Communications in the complaints, and would like to see them shut down and refunds issued.

Pentagon Announces Technology Projects

New technologies being developed by the U.S. Department of Defense include: a system to allow the military, police, fire and other emergency agencies to communicate with each other during catastrophes such as terrorist attacks; and a system to connect hand-held computers used by soldiers clearing land mines and other unexploded bombs to experts and a database to help them safely finish their jobs.

Grassroots FM Slow to Grow

Of the 3,400 amateurs nationwide who have applied for low-power FM licenses in the last two years, only five are on the air. "A lot of the people applying for these licenses will fail," said one applicant. "A lot of these people are altruistic - they're a little more dreamers than schemers."

And he's probably right; getting started hasn't been easy. One radio tower crashed to the ground while being installed in Danville, VA. Some would-be broadcasters lost their day jobs and couldn't afford equipment. Shifting federal rules meant many who had applied couldn't get licenses at all.

However, a sixth station did go on the air recently. WRYR (97.5 FM) made its inaugural broadcast from a 12-by-7-foot studio in Churchton in southern Anne Arundel County, VA. Its signal radiates across the Chesapeake Bay, reaching the western tip of the Eastern Shore, the southern fringes of Annapolis and parts of Calvert and St. Mary's counties. The station will celebrate the Chesapeake's diversity, says the owner.

WRYR got on the air during a three-day gathering dubbed a "Radio Barnraising," attended by over 100 radio dreamers and some experienced pirates. The ex-pirates helped with

seminars and hands-on experience in "Using a mini-disc recorder," "The fine art of deejaying," "Introduction to radio engineering." However, after WRYR's first broadcast day, the station is going silent except for periodic tests while volunteers are trained and equipment is fine-tuned.

Thanks to the Pirates

Here's an excerpt from an unusual editorial in the *Asheville (NC) Citizen-Times* in support of Free Radio Asheville.

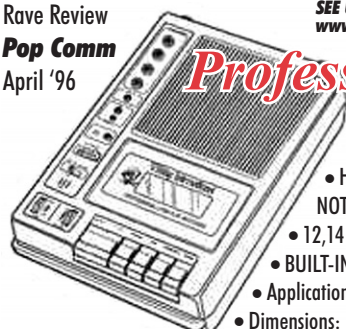
"While we don't condone illegal activity, we do strongly support the idea of low-powered, non-commercial community FM radio. Thankfully, the FCC recognized that it couldn't squelch the movement, so it established rules and began accepting applications for licenses. It initially said no individual connected with a pirate station could apply or be associated with licensed stations. But a U.S. Court of Appeals struck down the FCC rule as an unconstitutional infringement on free speech."

"Local, non-commercial radio will provide a forum for civic groups, activists, local musicians, schools - a whole range of voices that don't often get heard on commercial stations. And, as many others have before, they will owe a huge debt to those pirates whose acts of civil disobedience secured for them an opportunity to be heard when they exercise the free speech guaranteed to them in the U.S. Constitution."

Communications is compiled by editor Rachel Baughn KE4OPD from clippings and emails sent in by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Norman Hill, Arlington, V; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI. Via e-mail: John Diefenbach, James Hackett, Glenn Hauser, Hans Johnson, Rick Kissel, Bob Kozlarek, Mark Meece, Fred Moore, Ed Muro, Laura Quarantiello, Donald Strumpf, Larry Van Horn, Peter Vieth, Association of International Broadcasters

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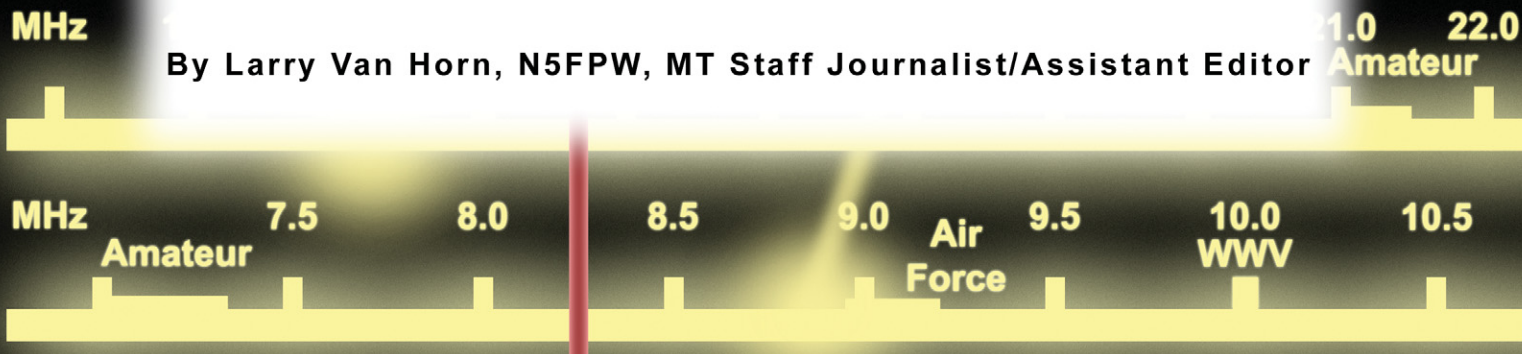
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Who's Who in the Radio Spectrum (Part 5) Your Road Map to the HF Amateur Radio Bands

By Larry Van Horn, N5FPW, MT Staff Journalist/Assistant Editor



"CQ CQ CQ this is N5FPW in Brasstown, North Carolina, calling CQ CQ CQ and standby by for a call please."

Spend some time tuning around the shortwave radio spectrum and you are bound to run into someone making a call like the one above. So what have you run into? Who is this N5FPW and what service is this?

This N5FPW guy is called an amateur radio operator or "ham" and you have found him on a frequency assigned to the amateur radio service.

If you spend any amount of time tuning around the shortwave radio spectrum you will soon discover that the busiest frequencies are the amateur radio bands. With over two million radio amateur operators, worldwide, that is a lot of folks talking within 3750 kHz of the frequency space.

Nobody knows for sure when amateur radio operators were first called "hams," but we do know that amateur radio is as old as the history of radio itself. In 1912, Congress passed the first laws regulating radio transmissions in the United States. By 1914, amateur experimenters were communicating nationwide, and setting up a system to relay messages from coast to coast. That is how the United States national organization known as the American Radio Relay League (ARRL) got its name.

The modern amateur radio service is like a paradox: though one of the oldest of all radio services, it is still on the cutting edge of modern technology. Transmission modes vary from the oldest (Morse code) to the newest digital modulation modes, including digital voice.

The Bands

The HF amateur radio service occupies

nine separate bands of frequencies in the shortwave spectrum. The bands and the frequency limits are listed in table one. We have also included an extensive frequency guide to various operating activities in the ham bands in that table.

The Modes

With the exception of 160 and 30 meters, all bands are subdivided into Morse code (CW) and voice subbands. CW is always found at the lower edge of each ham band. On the 160-meter band there is no official mode subdivision, but common usage has the 1800-1825 kHz section set aside for CW use. 30-meters is limited to non-voice only transmission modes.

There are a variety of modes used by hams in the HF spectrum. These include amplitude modulation (AM), narrowband frequency modulation (NBFM), single sideband (both lower and upper), Morse code (CW), American Standard Code for Information Interchange (ASCII), radio teletype-baudot (RTTY), slow-scan television (SSTV), HF facsimile (HFFAX), Amateur Teleprinting Over Radio (AMTOR), Packet TOR (PACTOR-I and II), Golay-TOR (G-TOR), Clover, HF Packet (AX25-300baud), PSK31, Hellschreiber fuzzy modes, MT63, Throb, and MFSK16.

Even now the future of ham radio is being addressed. Experimentation is being conducted on the bands using automatic link establishment (ALE) and digital voice protocols.

The Hunt

One reason radio enthusiasts listen to the ham bands is the aura of mystery – what will be heard today? Unlike broadcast stations,

there are virtually no set schedules (except for nets). Stations will come and go as they please. It is possible (especially during high sunspot count periods like right now), to log or work over 100 countries in one weekend. There are currently 334 amateur radio country entities to look for on the bands.

One reason overseas listeners listen to the ham bands is a practical matter – some countries require would-be hams provide proof of ability by logging and verifying a certain number of overseas hams. Until that is done they cannot be issued a license. For that reason I QSL 100 percent of all shortwave listener reports as soon as I receive them.

The Equipment

To receive ham transmissions, you will need a sensitive/selective communications receiver capable of single sideband (SSB) reception. This is NOT a job for cheap portables. Hams use much lower power and simpler antenna systems than, say, the big international broadcasters use. It is a much bigger challenge to log DX on the ham bands, so your equipment will have to be up to the challenge.

The antenna is critical. If you intend to listen to all the HF bands, an outside longwire antenna, preferably with an antenna tuner, will be your best bet. If you are going to DX only one or two bands, dipole antennas cut for these bands would be a good idea.

In recent times digital modes have become easier to work or monitor. Using a computer soundcard and software (usually free), the monitor will open up a whole new world of digital modes. See table two for websites to help locate software and get on the air.

The QSL Game

I love to QSL hams I have worked. You will find this to be a nice extension to an already enjoyable activity and it can earn you additional wall paper in the form of awards. Table two has a link to the best awards website on the internet. If you want to learn more about ham the ham QSL game, see Gayle Van Horn's feature article, "QSLing the Ham Bands" in the October 2001 issue of *Monitoring Times*.

So, if you hear N5FPW calling CQ and you're a licensed ham, give me a shout. I love to ragchew with *MT* readers on the bands. If you're an SWL, be sure to send me your reception report card and I will get one back to you.

73 and good hunting to all de N5FPW.

Table One: Amateur Radio Band Plans/ Operating Activity Guide

International Amateur Radio Union (IARU) Regions

Region 1 — Africa, Europe, former USSR countries, Middle East (excluding Iran) and Mongolia.

Region 2 — North and South America including Hawaii, Johnston and Midway Is.

Region 3 — The rest of Asia and Oceania.

160 Meters (1810-2000 kHz)

1800-1830	CW and digital modes [Region 2] CW [Region 3]
1810-1838	CW [Region 1]
1810	CW QRP calling frequency
1818	ARRL W1AW CW code practice and bulletin frequency
1820-1840	CW DX Window — no local contacts
1823-1828	CW DXpeditions Window (half frequencies — i.e. 1823.5, 1828.5 kHz, etc)
1830-1834	Radio Teletype (RTTY) and CW [Region 3]
1830-1840	CW DX window and digital modes [Region 2]
1834-1840	CW DX window — no local contacts [Region 3]
1838-1842	CW and digital modes (except packet AX25) [Region 1]
1838.15	Digital modes PSK31
1840-1850	Phone DX Window — no local contacts

1840-2000	Phone and CW [Region 3]
1842-2000	Phone and CW [Region 1]
1850-2000	Phone and CW [Region 2]
1855	ARRL W1AW Phone bulletin frequency
1907.5-1912.5	Japanese DX Window — no local contacts
1910	Phone QRP calling frequency
1960	Direction finding (DF) contest beacons [UK]
1995-2000	Experimental modes [UK]
1999-2000	Propagation beacons [UK]

80 Meters (3500-4000 kHz)

3500-3510	CW DX window — no local contacts [Worldwide]
3500-3560	CW Contest preferred segment [Region 1]
3500-3580	CW [Region 1]
3505	CW DXpedition favorite frequency
3510-3525	CW [Region 2]
3510-3535	CW [Region 3]
3525-3580	CW and phone permitted, non-interference basis [Region 2]
3525-3530	CW Secondary DX window — no local contacts
3530	CW IOTA calling
3535-3775	Phone and CW [Region 3]
3560	CW QRP calling frequency [Region 1/2]
3575-3585	HF Digital frequencies [USA]
3580-3590	CW and digital modes [Region 1]
3580-3620	Digital modes and CW, phone permitted, non-interference basis [Region 2]
3580	Digital mode Amateur Hellschreiber
3580.15	Digital mode PSK31
3581.5	ARRL W1AW CW code practice and bulletin frequency
3590-3600	CW and digital modes, packet (AX25) preferred [Region 1]
3590	Radio teletype (RTTY) DX frequency
3600-3620	Phone, digital modes and CW [Region 1]
3620-3625	Packet (AX25) priority and CW, phone permitted, non-interference basis [Region 2]
3620-3640	HF Digital frequencies [USA]
3625	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
3635-3775	Phone and CW [Region 2]
3650-3775	Phone and CW [Region 1]
3690	Phone QRP calling frequency [Region 1]
3700-3800	Phone contest preferred segment [Region 1]
3710	CW QRP calling frequency [USA-Novice/Tech Plus]
3730-3740	Slow Scan TV (SSTV) and facsimile (FAX) [Region 1]
3755	Phone IOTA calling

3775-3800	Phone DX Window — no local contacts [Worldwide]
3800-3840	Phone and CW [Region 2]
3800-3900	Phone and CW [Region 3]
3840-3850	Slow Scan TV (3845 kHz calling), facsimile, phone and CW [Region 2]
3850-4000	Phone and CW [Region 2]
3860	WA3NAN Goddard SFC ARC Space Shuttle Mission Audio
3866	Phone County Hunters net and calling frequency
3885	Phone (AM) calling frequency
3903	Phone County Hunters net and calling frequency [USA]
3975	National Hurricane Center weather net alternate (during threatening conditions)
3985	Phone QRP calling frequency [USA]
3990	ARRL W1AW Phone bulletin frequency

40 Meters (7000-7300 kHz)

7000-7010	CW DX Window [Worldwide]
7000-7025	CW [Region 3]
7000-7035	CW [Region 1/2]
7025-7030	Narrowband modes and CW [Region 3]
7030-7040	Narrowband modes, phone and CW [Region 3]
7030	CW QRP calling frequency [Region 1]
7030	CW IOTA calling
7035-7040	Digital modes with other regions and CW [Region 2]
7035-7045	Digital modes (except packet AX25), CW, SSTV/FAX [Region 1]
7035	CW QRP calling frequency [QRP-L]
7035.15	Digital mode PSK31 [Region 1 and 3]
7037.0	Digital mode Amateur Hellschreiber
7039.5	CW County Hunters net and calling frequency [Worldwide]
7040-7045	Digital modes (except packet and SSTV/FAX), phone and CW [Region 1]
7040-7050	Packet (AX25) and CW [Region 2]
7040-7100	Phone and CW [Region 3]
7040	Radio teletype (RTTY) DX frequency/CW QRP calling frequency [USA]
7045-7100	Phone and CW [Region 1]
7047.5	ARRL W1AW CW code practice and bulletin frequency
7050-7100	Phone and CW [Region 2]
7060-7080	HF Digital frequencies [USA]
7060	Phone IOTA calling [Worldwide]
7080.15	Digital mode PSK31 [Region 2]
7090	Phone QRP calling frequency [Region 1]
7095	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
7100-7120	Digital modes, phone and CW [Region 2]
7100-7300	Phone and CW, secondary assignment in Australia and New Zealand. [Region 3]
7110	CW QRP calling frequency [USA-Novice/Tech Plus]
7120-7165	Phone and CW [Region 2]
7165-7175	Slow Scan TV (7171 kHz calling), facsimile, phone and CW [Region 2]
7175-7300	Phone and CW [Region 2]
7185	WA3NAN Goddard SFC ARC Space Shuttle Mission Audio
7238	Phone County Hunters net and calling frequency [USA]
7243	Phone County Hunters net and calling frequency [USA]
7250	Phone U.S. Islands Hunters calling frequency [USA]
7285	Phone QRP calling frequency [USA]
7290	Phone (AM) calling frequency/ARRL W1AW Phone bulletin frequency



30 Meters (10100-10150 kHz)

10100-10130	CW [Region 2]
10100-10140	CW [Region 1/3]
10106	CW QRP calling frequency
10110	CW DXpedition favorite frequency
10115	CW IOTA calling
10116	CW QRP calling frequency [QRP-L]
10130-10140	Digital modes and CW [Region 2]
10130-10145	HF Digital frequencies [USA]
10137	Digital mode Amateur Hellschreiber
10140-10150	Digital modes (except packet AX25), CW [Region 1]
	Packet (AX25) priority and CW [Region 2]
	Narrowband modes and CW [Region 3]
10142.15	Digital mode PSK31

20 Meters (14000-14350 kHz)

14000-14060	CW contest preferred segment [Region 1]
14000-14070	CW [All Regions]
14025	CW DXpedition favorite frequency
14040	CW IOTA calling
14047.5	ARRL W1AW CW code practice and bulletin frequency
14056.5	CW County Hunters net and calling frequency
14060	CW QRP calling frequency
14062.5	Digital mode MFSK16
14063.5	Digital mode Amateur Hellschreiber
14065-14090	HF Digital frequencies [USA]
14070-14089	Digital modes and CW [Region 1]
14070-14095	Digital modes and CW [Region 2]
14070-14099.5	Narrowband and CW [Region 3]
14070.15	Digital mode PSK31
14080	RTTY DXpedition favorite frequency
14089-14099	Digital modes (Packet AX25 preferred) and CW [Region 1]
14095-14099.5	Packet (AX25), digital modes, and CW [Region 2]
14095	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
14099-14101	Propagation beacons [Region 1]
14099.5-14100.5	Propagation beacons [Region 2/3]
14100.5-14112	Packet (AX25), phone and CW [Region 2]
	Narrowband, phone and CW [Region 3]
14100	NCDXF/IARU propagation beacons
14101-14112	Digital modes (Packet AX25 preferred), CW and phone [Region 1]
14112-14125	Phone and CW [Region 1]
14112-14225	Phone and CW [Region 2/3]
14125-14300	Phone contest preferred segment [Region 1]
14195	Phone DXpedition favorite frequency
14225-14235	Slow Scan TV (14230 kHz calling), facsimile (FAX), phone and CW [All Regions]
14235-14350	Phone and CW [Region 2/3]
14250-14260	Phone U.S. Islands Hunters calling frequency [USA]
14260	Phone IOTA calling
14285	Phone QRP calling frequency
14286	Phone (AM) calling frequency



14290	ARRL W1AW Phone bulletin frequency
14295	WA3NAN Goddard SFC ARC Space Shuttle Mission Audio
14300-14350	Phone and CW [Region 1]
14325	National Hurricane Center weather net (during threatening conditions)
14336	Phone County Hunters net and calling frequency

17 Meters (18068-18168 kHz)

18068-18100	CW [All Regions]
18075	CW DXpedition favorite frequency
18096	CW QRP calling frequency
18097.5	ARRL W1AW CW code practice and bulletin frequency
18098	CW IOTA calling
18100-18105	Digital modes and CW [Region 2]
18100-18109	Digital modes and CW [Region 1]
18100-18110	HF Digital frequencies [USA]
18100-18110.5	Narrowband and CW [Region 3]
18102.5	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
18105-18109.5	Packet (AX25) priority and CW [Region 2]
18106	Digital mode MFSK16
18109-18111	Propagation beacons [Region 1]
18109.5-18110.5	Propagation beacons [Region 2]
18100.15	Digital mode PSK31
18110-18168	Phone and CW [Region 3]
18110	NCDXF/IARU propagation beacons
18110.5-18168	Phone and CW [Region 2]
18111-18168	Phone and CW [Region 1]
18128	Phone IOTA calling
18130	Phone QRP calling frequency
18145	Phone DXpedition favorite frequency
18160	ARRL W1AW Phone bulletin frequency

15 Meters (21000-21450 kHz)

21000-21070	CW [Region 2/3]
21000-21080	CW [Region 1]
21025	CW DXpedition favorite frequency
21040	CW IOTA calling
21060-21090	HF Digital frequencies [USA]
21060	CW QRP calling frequency
21063	Digital mode Amateur Hellschreiber
21067.5	ARRL W1AW CW code practice and bulletin frequency
21070-21090	Digital mode and CW [Region 2]
21070-21125	Narrowband and CW [Region 3]
21070.15	Digital mode PSK31
21080-21120	Digital modes and CW [Region 1]
21080	RTTY DXpedition favorite frequency
21090-21125	Packet (AX25) priority and CW [Region 2]
21095	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
21100-21120	Digital modes (Packet AX25 preferred) and CW [Region 1]
21110	CW QRP calling frequency [USA-Novice]
21120-21149	CW [Region 1]
21125-21149.5	CW [Region 2/3]
21149-21151	Propagation beacons [Region 1]
21149.5-21150.5	Propagation beacons [Region 2/3]
21150	NCDXF/IARU propagation beacons
21150.5-21335	Phone and CW [Region 2/3]
21151-21450	Phone and CW [Region 1]
21260	Phone IOTA calling
21285	Phone QRP calling frequency
21295	Phone DXpedition favorite frequency
21338	Phone County Hunters net and calling frequency
21335-21345	Slow Scan TV (21340 kHz calling), facsimile (FAX), Phone and CW [All Regions]
21345-21450	Phone and CW [Region 2/3]
21350	Phone U.S. Islands Hunters calling frequency



	[USA]
21385	Phone QRP calling frequency [USA]
21390	ARRL W1AW Phone bulletin frequency
21395	WA3NAN Goddard SFC ARC Space Shuttle Mission Audio

12 Meters (24890-24990 kHz)

24890-24920	CW [All Regions]
24895	CW DXpedition favorite frequency
24906	CW QRP calling frequency
24920-24925	Digital modes and CW [Region 2]
24920-24929	Digital modes and CW [Region 1]
	Narrowband and CW [Region 3]
24920-24930	HF Digital frequencies [USA]
24920.15	Digital mode PSK31
24925-24929.5	Packet (AX25) priority and CW [Region 2]
24929-24931	Propagation beacons [Region 1]
24929.5-24930.5	Propagation beacons [Region 2]
24930	Propagation beacons [Region 3]
	NCDXF/IARU propagation beacons
24930.5-24990	Phone and CW [Region 2]
24931-24990	Phone and CW [Region 1/3]
24945	Phone DXpedition favorite frequency
24950	Phone QRP calling frequency [USA]
	Phone IOTA calling

10 Meters (28000-29700 kHz)

28000-28050	CW [Region 1/3]
28000-28070	CW [Region 2]
28025	CW DXpedition favorite frequency
28050-28120	Digital modes and CW [Regional 1/2]
28050-28150	Narrowband and CW [Region 3]
28060	CW QRP calling frequency
28067.5	ARRL W1AW CW code practice and bulletin frequency
28070-28150	Radio teletype (RTTY)
28095	ARRL W1AW Digital mode bulletin frequency (Baudot, AMTOR, FEC Mode B, 110-baud ASCII)
28110-28125	HF Digital frequencies [USA]
28110	CW QRP calling frequency [USA-Novice]
28120-28150	Digital modes (Packet AX25 preferred) and CW [Region 1]
28120-28189.5	Packet (AX25) priority and CW [Region 2]
28120	Digital mode Amateur Hellschreiber
28120.15	Digital mode PSK31
28150-28190	CW [Region 1/3]
28189.5-28190.5	Worldwide propagation beacon network #2 [Region 2]
28190-28199	Regional time shared international propagation beacon project [Region 1]
28190-28200	Propagation beacons [Region 3]
28190.5-28199.5	Intra-regional propagation beacon network [Region 2]
28199-28201	Worldwide time shared international beacon project [All Regions]
28199.5-28200.5	Propagation beacons [Region 2]
28200-28300	CW [Region 3]

28200.5-28225	Propagation beacons and CW [Region 2]	29300-29510	Amateur satellite downlinks [All Regions]
28200	NCDXF/IARU propagation beacons	29510-29700	Phone and CW [Region 1]
28201-28255	Continuous duty international beacon project [Region 1]	29510-29700	FM Phone and repeaters [Region 2]
28225-29200	Phone and CW [Region 1]	29510-29700	Wideband 96 kHz) and CW [Region 3]
28225-28670	Phone and CW [Region 2]	29520-29590	Phone (FM) repeater inputs
28300-28675	Phone and CW [Region 3]	29550-29700	Phone and CW [Region 1] (Some experimental FM repeaters can be established)
28336	Phone County Hunters net and calling frequency	29600	Phone (FM) simplex
28345	Phone 10-10 International Calling frequency	29610-29700	Phone (FM) repeater outputs
28360	Phone QRP calling frequency [Region 1]		
28380	Phone 10-10 International Calling frequency		
28385	Phone QRP calling frequency [USA-Novice/Tech Plus]		
28425	Phone 10-10 International Calling frequency		
28450	Phone U.S. Islands Hunters calling frequency [USA]		
28460	Phone IOTA calling		
28560	Phone IOTA calling		
28590	ARRL WIAW Phone bulletin frequency		
28650	W3NAN Goddard SFC ARC Space Shuttle Mission Audio		
28660	Slow Scan TV repeater frequency (GI4GTY Lagan Valley Amateur Radio Society UK)		
28670-28690	Slow Scan TV (28680 calling), facsimile (FAX), phone and CW [Region 1/3]		
28675-28685	Slow Scan TV (28680 kHz calling), phone and CW [Region 3]		
28685-29300	Phone and CW [Region 3]		
28690-29300	Phone and CW [Region 2]		
28885	Phone QRP calling frequency/International 6-meter DX Propagation alert frequency		
29000-29200	Phone (AM) frequencies		
29200-29300	Digital modes, narrowband FM Packet (AX25), phone and CW [Region 1]		

Notes:

1. The word "Phone" includes all permitted forms of telephony. CW is Morse Code.
2. Lower Sideband (LSB) is recommended on bands below 10-MHz, and Upper Sideband (USB) recommended on bands above 10-MHz.
3. Digimodes are defined as including: AMTOR, PACTOR, Clover, ASCII, RTTY (Baudot), PSK31, MFSK, and AX25 packet.
4. QRP indicates very low power (usually 5 watts or less).
5. DX is a ham abbreviation for distant station.
6. IOTA stands for Island On The Air.
7. The 10 MHz band is allocated to the amateur radio service only on a secondary basis. The International Amateur Radio Union (IARU) has agreed on a worldwide basis that only CW and digital modes (narrowband modes) are to be used in this band. Likewise, the band is not to be used for contest and bulletins.

Table Two: Amateur Radio Websites

The number one website on the internet for ham radio information. The 170,000+ members of the ARRL are among the most active and enthusiastic amateurs in the country. Headquartered in Newington, CT, ARRL speaks for its members in Washington and internationally as well as providing direct member benefits. This is a huge site with many pages on amateur awards; contest info; special event station schedules; rules, regs and license info; ham bulletins (DX/ Propagation/ General), public service info, and much more. This is a must bookmark for any active ham or SWL.

This is simply the best site on the internet for ham radio links. If you can't find it here, chances are it isn't on the net.

One of the best features of amateur radio is the number of ways there are to enjoy this hobby: ragchewing, experimentation, VHF/UHF, packet, traffic handling and more. I enjoy DXing, contesting and award collecting. The best spot on the net to learn more about ham awards belongs to Ted KIBV.

The Leader of the Pack...

Alphanumeric display aids station recognition, and you can accurately direct-enter frequencies via the keypad, or manually search with the rotary tuning dial. Fine-tune those SSB stations with 40 Hz precision, or let the 909's automatic search feature find the strongest shortwave stations for your listening pleasure! What more could you wish for in an affordable, high performance, world band receiver?

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www.grove-ent.com

Ham Radio: More Than Just a Hobby

By Arthur R. Lee WF6P



Marsha Messer, AB7RJ, and the author, WF6P, tuning in the 40 meter Baja Maritime Mobile Net (7.260 at 0800 -0900 PDT) to contact boaters sailing off the coasts of California and Mexico.

I just finished a thirty minute CW QSO (contact) with someone whom I consider a hero. When the Japanese bombed Pearl Harbor on December 7th, 1941, Roy Hubbard, KB6VTH, was a navy radioman aboard the old battleship *USS Utah*. I met him recently at a meeting of the Pearl Harbor Survivors Chapter in Santa Cruz, California.

During the attack, Roy barely escaped from the radio shack below decks when his ship rolled over and sank. He told me that he was the last man out of his compartment as the ship filled with water. As the ship began to capsize, he climbed ladders from deck to deck as men were trapped when hatches slammed shut. On the sloping deck, Roy escaped by climbing over the rail and sliding down the overturning hull. In the water, Roy dodged bullets from Japanese fighter planes strafing sailors in the water and on Ford Island.

Our QSO this afternoon was highly satisfying for me, as I was a 13 year old then, living only a mile from Roy's ship as it sank. Today, we came up on 40 meters on CW and banged out our words in the old familiar code. Roy said he now worked voice, mostly, but would give me a chance to practice my code. I will have to find out how Roy survived the rest of WWII in the Pacific.

A decade ago, I worked another ex-navy radioman, Bob Brouwer, N6HLE. He served aboard the cruiser *USS Raleigh* a day before it was bombed and severely damaged at Pearl Harbor. For our QSOs, Bob used his old navy bug and I found it a rhythm difficult for me to copy.

Love at first hearing

Since my early youth, I always had a fascination with ham radio and the "miracle" of

talking over the air. Before and during WWII, the movies were filled with dramatic scenes of radio operators pounding away on their telegraph keys. In those days, communications was not something taken for granted. There was no internet or email. Household telephones hung on walls, were scratchy and long distance calls expensive. Telephone operators asked, "Number please?" Up to four households shared party lines. Consequently, telephone calls were short in nature.

In high school near the end of WWII, I took classes in Radio Shop, as it was then known. The word "electronics" had yet to be coined. Our shop teacher gave us boxes of coils, transformers, tubes, resistors, condensers, and hookup wire. We were taught to solder with the old 150 watt American Beauty soldering irons with tips as big as our thumbs. Under the close guidance of Clarence W. Nelson ("CW" Nelson, (SK)) we students followed our wiring diagrams and produced various projects including workable nine tube superhetrodyne receivers. Ah! The excitement and reward of having AM reception when power was applied! Well, there was one moment of alarm when my erroneously soldered-in-reverse condenser blew up!

One night at church services, one

of my fellow students brought in a shortwave receiver, a Hallicrafters S-20R. For the demonstration, he set the rig up on a table and strung a short wire antenna along one wall. He tuned in on missionaries in South America transmitting on the ham bands to friends in Chicago! I was hooked! How could I get a ham license and get on the air to worldwide ham stations?

In 1945, getting a ham license required a great deal of study and the mastery of Morse code. To me, at about 10 words per minute, this seemed like an impossible speed. I tried to learn the code but before I could achieve results, the US Navy beckoned me and off I went in that direction.

A happy ham

After retirement, my old desire to get a ham ticket was finally satisfied. The Novice



The author's granddaughter, Cheri, KE6BOP, practicing Morse code with a code practice oscillator and paddle.

Enhancement program was in effect in 1980 and classes taught by our local ham club enabled many of us to pass the Novice test. The exams were only 20 questions and quite simple. The completed exams were collected by our instructor, sealed and mailed to the FCC for grading. We were all able to pass the five word per minute code tests. It took nearly three months to learn if we passed the exam. Our notification was our Novice ticket in the mailbox.

With many frequencies and bands open to Novices in the CW mode, getting our CW speed up was a natural progression. As I tell everyone, you can't keep your CW speed slow if you keep working with it. Through use, it just naturally speeds up. With the door open for advancing up through the license classes, more and more frequencies became available.

Contacts on CW and voice produce some interesting QSOs. Rag chewing was fun! I soon found that everyone I met was interesting. My brother-in-law got his general class license in hopes of someday talking on the air to his idol, the famous guitarist, Chet Atkins, W4CGP (ex-WA4CZD). Regrettably, that will not happen as Chet died on June 30th of 2001.

Talking to other amateur radio operators throughout the world was exciting. Contacts were made with soldiers, sailors, lawyers, doctors, pilots, stock clerks, mothers and grandmothers. We all shared in the camaraderie of being able to converse with one another over ham frequencies.

A young girl in the iron range of Minnesota told us of her life in that cold-winter state. Hams on hot, humid Pacific islands told us of their adventures as well as hams in frozen Antarctica telling us of theirs. Talking to a Russian ham on Sakalin Island before the fall of the Berlin Wall was fascinating.

It's not just a hobby

One of my special interests is Maritime Mobile operation. To work those hams at sea I put up a small tower and beam. Checking in

on the maritime mobile nets gave me contacts with boats sailing anywhere from the Indian Ocean to the Atlantic off South Africa. Running phone patches for some of the boats gave me the opportunity to bring a little bit of home to those at sea.

I once ran a series of phone patches for a sailor from our city. Although I didn't know him, he was en route from the Galapagos to Tahiti. He later told me that hearing the voice of his son brought him happiness and tears of joy. Those QSOs were the highlights of his days.

Then came emergencies. Typhoons, hurricanes, earthquakes and floods all needed and used ham communications. Even in these modern times where cell phones jut out of every pocket and purse, cells go "down" or become clobbered with calls. Hams are brought in to handle emergency communications, both local and long range.

One of the best parts of ham radio I have found is the making of lifetime friends. Over the past two decades, my family (all hams) have met and made hundreds of friends they would never have met if it weren't for ham radio. A special joy is to meet an old on-the-air friend in person for an "eyeball" QSO. A few years ago when traveling cross country in our trailer, we detoured a few hundred miles to meet a CW operator and his wife. Our intention was to stop for a cup of coffee – but our hosts wouldn't let us leave for three days and two nights. They had a wonderful dinner prepared for our arrival. While there we toured their Arkansas town and even had a refreshing swim in the clear waters of their river.

Ham events such as field day, club meetings, volunteer examining and teaching all bring the ham communities together. Within my own family, we keep in touch via HF radio on a regular basis, including now, our grandchildren. Two-meter rigs on our vehicles keep us in touch with each other when conveying to picnics or other family group events.

Lastly, keeping in contact with my wife when I am away on boat trips is comforting for both of us. My wife fires up our ICOM IC-761 transceiver and gives me a daily report on how things are going at home, what the mail brought in and what phone calls we may have received. Our daughter sometimes gets on from her Sacramento home, also, giving us a "three-way conversation." I relax in the cockpit or cabins of boats hundreds of miles away and tell her about the adventures I am hav-



A beam antenna is helpful in sending signals in the desired direction.

ing on the briny deep. As the words to one 1950s song says, "little things mean a lot!"

Ham licenses are now easier to obtain than at any other time. Question pools with answers only require a certain amount of rote memory to pass tests. The code is no longer required for the new Technician license. For General and Extra class licenses, only proficiency in Morse code up to five words per minute is required.

How to Get Started

Tapes and CDs for code training and study materials for an Amateur Radio license may be obtained by contacting the American Radio Relay League at 225 Main Street, Newington, CT 06111-1494. The League will provide helpful advice and be happy to provide their free informative Prospective Ham Package. Call their toll-free number 1-888-277-5289. e-mail: newham@arrl.org or visit their web site at <http://www.arrl.org/> Materials by Gordon West are also available from the W5YI Group (see ad in MT).

About the author...

Arthur Lee retired from the U.S. Navy with the rank of Commander. He Taught Aviation Maintenance Management at Embry-Riddle Aeronautical University and Aeronautics, Amateur Radio Communications and Magazine Article Writing at Cabrillo College. He graduated with a BA degree in Business Management and Masters Degree in Public Administration from San Jose State University. <http://www.3dviewmax.com/lee.htm>



Marsha Messer, AB7RJ, makes a Morse code contact with friends.

The Pirate Hams of Forty-Five

The lowdown on European illegal amateur operators

By Finbarr O'Driscoll

It was by chance some years ago that I became aware of the existence of European pirate ham operators. With some success over time from my location in Ireland, I had been hearing South East Asian VOLMET services on 6676 kHz Upper Side Band (USB) out of Bangkok, Singapore, and a few other faraway places. VOLMET is an important round-the-clock service of weather information for aircraft in flight. On one particular morning, I heard interfering chatter-splatter coming from a nearby frequency...

Backing down the dial a little in order to zero in on the signal, I still didn't manage to resolve the speech, which puzzled me, as I had expected to hear an out-of-band maritime contact proceeding in USB mode. It would not have been very unusual to hear illegal ship-to-ship or ship-to-shore communications proceeding apace in Spanish. I was quite attuned to hearing the familiar "cambio" as fishermen passed a frequency over to one another from scattered locations out in Irish waters, where there is always a large Spanish fishing presence.

Pirate Hams

Anyway, it took a push of a button on my radio to get everything in the clear. I switched sidebands and right there, on 6675 kHz Lower Side Band (LSB), was a communication in plain English. A little bit of eavesdropping told me what I wanted to know...two guys were nattering happily with one another as they drove along the roads of England. They employed some of

the habits and jargon of licensed hams, but they were certainly not in a designated ham band. The nearest one on the dial, 40 meters, runs 7000 - 7100 kHz in Europe.

After a few minutes of listening to their ragchew, other oddities became obvious. For a start, they were coy to the point of secrecy about detailing their locations, giving only vague information like "I'm down Devon and Cornwall way." Well, great, but that's two whole English counties. I had often heard licensed hams working out of Cornwall and the like. They were always proud to tell the whole world that they lived in such-and-such village, or were running a Special Event Station from a particular lighthouse, a Scout Jamboree, or whatever. No, these people were oddly cloak-and-dagger and the very few times that they mentioned their station callsigns bore that point out all the more.

As it turned out, those very callsigns made no sense for English operators. In fact, they made no sense for use by licensed hams anywhere. You guessed it; the callsigns were unregulated fakes.

Calling Frequency

European pirate hams have a favorite set of frequencies for making voice contact with one another. Less and less nowadays it is called the "Echo Charlie Band," a term that goes back decades and whose origin is uncertain. The preferred current name is "45," short for "45 Meter Band."

Confusingly, "Echo Charlie" has been used also to denote 86 meters, another (but much less popular) haven for the European pirates. "45" has an international calling frequency at 6670 kHz LSB, but that is the subject of some debate, indeed acrimony, among the "renegades" (a self-descriptive term used by a few of them!).

There is a substantial gulf between some English-speaking pirates and a portion of their German-tongued counterparts as to the exact function of 6670. The latter faction denies that 6670 is a calling spot, from which to move to an agreed other frequency once a contact has

been established. Instead, the faction claims that it is solely a "German frequency." If the wrong guys on both sides are around at the same time, very nasty things get said, taunts are flung, expletives abound, and live voice-jamming goes on endlessly. This kind of mess is the inevitable outcome when factions of an irregular crew try to regulate each other.

Players and Jammers

There is some hearsay to suggest that the hard-liners in Germany are strays from the Citizen Band (CB) part of the radio spectrum. One hears things like: "It's the Berlin guys from 11 meters." However, in saying that, there is a danger of casting an unwarranted general slur on users of CB radio. I have also noticed that another frequency, 6660 kHz, is a favorite spot for contacts in French, despite seeing reports that the spot is supposed to be an Italian calling point. That same frequency is often the source of persistent loops of electronically sampled music or voice fragments. The samplings are often syllables of French. It might be the Francophones themselves being skittish, but if this is someone's idea of jamming the monsieurs on 6660, it doesn't seem to work.

From listening to their talk it is obvious that many regular players do indeed come to "45" with CB radio experience. There are others who betray the fact that they are disenchanting formerly licensed hams. More are never-wannabee-licensee types. I have heard gifted technophiles who just wanted to get some risky radio fun. And of course, there are the "groaners." The last lot have been described with that very term (or as "hoboes") by other operators, but there is no widely used term. Whatever the moniker, those folk like to lurk on a frequency and interfere with a contact by making annoying noises.

Incidentally, the most conventional and informative of contacts take place during the day. The "groaners" are mostly night-owls. If the participants in a contact move for quietness' sake to another frequency (even to another band,



Alinco DX-70: modifying the configuration of some chip-resistors inside allows unlicensed hams on the air.



Icom IC-725: pirate hams open blocked transmit bands to get on "45".

like 86 meters), the interfering station often follows to continue the prank. I once heard a pirate surmise that such interference was being caused by legitimate hams who were trying to frustrate the "45-ers." He consoled himself with: "We don't bother their bands, do we? Anyway, we have nothing to lose...but they will lose their licenses!"

That was ironic logic coming, as it did, from a hobbyist who didn't mind being a likely source of interference to authorized professional voice or data traffic on a designated set of frequencies.

Friendly Advice

After monitoring the 45 meter band for a while, it becomes perfectly clear that the "Echo Charlies" are conscious of the fact that they run the risk of causing interference to some civil and military aeronautical frequencies. There are a few unwritten guidelines which seem to exist for the purpose of preventing interference, but in reality those strictures have a quite different priority, namely, protecting an individual operator. Hiding one's exact identity and precise location is always foremost in the pirate's mind. A complaint of interference followed by detection and conviction would result in the confiscation of expensive equipment, together with the imposition of a hefty monetary penalty. Fines equivalent to thousands of US dollars would be normal, as evidenced by a reported case in Germany.

Even though they readily give out a first-name to a contact, one can not be certain that "John" or "Enrico" or "Mary" is an operator's real name. Here is some of the direct or implied advice that canny and experienced pirates pass on to the loose-tongued or to newcomers:

"I've got to be careful now...I can't give you any more details of where I am. You never know who's listening."

"I'm near the south coast...that's as much as I'm prepared to say. Give me your location, no details, just roughly."

"This is a very dangerous band...used by military and civil air services. There are severe penalties in this country."

"Do you have an e-mail address? You said you know Bravo Delta. Okay, pass it to him for me sometime, but off-air, repeat, not on the air."

"Your name again? My memory's not so hot, with all those turns on the coil (-jargon for being elderly). And I never write anything down here about this band...other bands, yes, but not this band."

"I was causing TVI (television interference) to my neighbors...that got a bit scary. Someone could have started investigating. So, pick your time for going on air carefully and keep your power low."

"I have to get off the air when my wife goes on the phone...otherwise I wipe her out. Never heard anything from the houses around, so that's a good thing for me."

"I'm maritime mobile a lot, like now, hahaha, so the antenna bothers nobody. Ever consider a loop or something up inside the roof-space?"

"You have no callsign? That's okay, this is a pirate frequency. You can make up your own callsign anytime you want."

"Never go below 6630...don't go above 6690 either."

"I heard that some French stations were starting to exchange QSLs (reception reports), using a P.O. Box...that's a real no-no, definitely."

"Here's how I'll give you the phone number...I know it's dangerous...two digits tonight, two tomorrow and like that until I'm finished."

Callsigns

The subject of callsigns as used by the "45" folk is intriguing. In general, the signs are no indicator whatsoever of the country of residence of the pirate, which is the very opposite to the case with licensed hams. Among the latter, call prefixes like EI- or G- absolutely guarantee that the stations are in the Republic of Ireland or the United Kingdom respectively. On the other hand, an Irish or UK pirate might use anything that appeals to him or her, nor do the signs have to consist of a prefix and suffix. Here are some examples of the first two alphanumeric characters in callsigns for stations claiming to be in the Republic of Ireland, whose signal and operator's accent would indicate to an experienced listener that the claim is most likely true: AD --, IC --, 11 --, EB ---, OW --. And here are a few stations in England: VL --, YB --, WZ --, KW --.

Any resemblance in this selection to actual internationally recognized country prefixes should be seen as coincidental. At my location, there are many more patternless arrays of signs to be logged from stations reputedly in Scotland, Wales, Northern Ireland, Norway, Netherlands, and so on. Occasionally, one can see what seems to be a hint of the thinking behind a particular callsign. One sign that I have logged ends with - - 007, surely a James Bond joke.

Another that I have heard began with SWL - -, no country of origin confirmed. Here again one can guess that there is a pun, as everyone will recognize the standard shorthand for Short Wave Listener.

Presumably, there is some logic to every callsign, even if its immediate relevance is only obvious to the person who chose it. I have heard operators explaining to their contacts that their signs were based on the model-number of a radio rig, or an antenna. There is a known account of a former pirate whose callsign was invented on air on the spur of the moment from something that was stamped on an old radio-valve which was lying about in his shack.

Sometimes a pirate is nationalistic enough to want to include a truthful prefix, whereas the remainder of the sign is unorthodox and illegal: A certain EI - station convinced me with his accent and the content of his conversation that he was genuinely southern Irish. And EA - - really seemed to be in Spain. Also LN - had me believing that his location was definitely Norwegian. One afternoon, a lady operator with a strong East London "cockney" accent was completely acceptable as a G-station, as her callsign indicated, although it emerged that she was traveling in France. However, her full sign, a mere three characters long, was completely lacking the added designators, which a legal operator would always use, to show that she was out of her country of residence and mobile.

Frequency Regime

If 6670 kHz LSB passes muster for the majority as an international calling frequency, then those pirates, who wish to keep to their own guidelines, agree to tune upward or down in tandem to continue a contact, leaving the calling frequency for others. Almost without exception they slew up or down in 5 kHz steps. Only rare contacts break this rule of thumb. Furthermore, it is easy to confuse certain stray maritime communications with "Echo Charlies," when the maritime traffic is in uncharacteristic LSB mode. So in general, LSB frequencies on either side of 6670, whose last two digits are divisible by five, are the spots where the action is.

In my experience the lower parameter of 6630, as quoted in the "advice" above may be crafty coaching, but it is not actually valid as a lower limit. There has been English-language activity on 6610. And not only stints of music but also communications in French have turned up on 6595.

Lots of shortwave receivers are designed to slew through the broadcast bands in increments of 5 kHz, but if an SWL is monitoring on a set which can do this in LSB mode, then checking around for "45" activity is made simpler. The odd form of transmit-tuning used by the pirates is an unknown practice among legal hams in their designated bands. Legals will alter tuning in any increment that is necessary in order to get a relatively clear contact. It is tempting to think that the pirate technique is meant to prevent landing on a designated aeronauti-



Kenwood TS-50: popular with "Echo Charlies" for their illegal ham transmissions.



Yaesu FT-747: “mod” version of this transceiver is used by Euro pirate hams.

cal frequency. However, the simple mathematics of the thing doesn’t mesh with published aero-frequencies.

Besides the fact that “channeling” is a CB-type convention, it has been suggested that there may be no great choice in the matter of tuning; the design of the transceivers used might dictate how things are done. Pirate hams invariably seem to work with factory-built ham rigs and not with special home-brew designs. They open blocked transmit-bands by modifying circuit boards. Needing only a small degree of derring-do and a shot of know-how, they remove jumper-connectors, nip the leads to diodes, and dab on small wire bridges with a few drops of solder. Modification instructions (“mods”) are not too difficult to locate for those with a nose for that sort of thing. In “mods” for certain short-wave transceivers known to be in use on “45” (Alinco DX-70, Icom IC-725, Yaesu FT-747, Kenwood TS-50), nowhere is it stated that the result of successful modifications would be anything other than “full transmit.”

Associated Bands, Modes, Antennas

As expected, radio signals on the 45 meter band propagate like those on the nearby legitimate 40 meter ham band. Conditions are usually robust for many hours after local daybreak, enabling signal-hops of many hundreds of miles within individual countries and between neighboring jurisdictions. As local noon approaches and for a few hours afterwards, communications die down as propagation is degraded and atmospheric noise levels rise.

But, things bounce back in the mid-to-late afternoons and talk can often be heard late into the night when propagation distances are considerably longer. Lateness is curtailed wintertime. Also after dark, when the 86 meter band has opened, a few of the same operators who frequent “45” can be heard on or near the calling-frequency for “86,” namely 3475 kHz LSB.

It is worth noting that the nearby 3476 kHz USB is a reserved frequency for North Atlantic Oceanic Air Traffic Control (NAT ATC). It is used regularly by Oceanic Control, being listed for New York Air Radio on the west side of the area and Santa Maria, Azores, on the south. But on the European side, their sister-station “Shanwick” (part of Shannon Air Radio on Ireland’s west coast) is a user of the frequency, too, in the hours of darkness, whenever conditions demand. The proximity of 3475 LSB and 3476 USB is a perfect example of how close the pirates can get.

Some “45ers” refer to the 86 meter band

as “85”. A similarly loose term is applied to a set of frequencies much higher up the dial. They often talk of, and occasionally use, the “15 meter band.” The calling-frequency is 20930 kHz USB. However, more than once I have logged a “45er” telling a contact that calling should be done on 20970 USB. Both frequencies actually fall into the 14 meter part of the spectrum, yet “14” is a term very rarely heard. European pirates

also make forays into the “21 meter band,” where on an afternoon it is common enough to hear calling on 13970 kHz USB, but not much answering.

Over the next one or two winters, there are plans afoot by a small group of enthusiasts to attempt things near “Top Band” (the legal-for-hams 160 meter band). Apparently, “a few of the boys are going to put up long-wires to try something, somewhere above 2 megahertz.” According to the source of this information, the bandidos were not relishing the thoughts of all the atmospheric noise that would be encountered in the experiment.

Over a particular two-month period when I had opportunity to listen regularly for pirates, I was not surprised to have heard Morse Code (CW) once or twice on “45”. A similar minuscule amount of CW has shown up on “21”. Infrequent transmissions of Slow Scan Television (SSTV) also occur on “45”, most often between stations within Scotland, or within France, but that would depend on where the enthusiasts are located.

By the way, “45ers” are like licensees in the large selection of antenna-types that they employ. I have heard talk of homebrew wire dipoles and commercially obtained verticals, the latter obviously nearly always for mobile use. I have also noted references to ownership of inverted-Vs, quads, Windoms, and at least one rhombic “hanging from the trees.” Of course, the famous G5RV, full-size and “half-size over a postage-stamp garden” turns up regularly.

Power and Audio

As mentioned earlier, “45ers” advise newcomers to use low power output from their stations. There is only occasional evidence of the use of amplifiers. For sure, pirates seldom if ever boom like that minority of legal hams who love to use signal-amplifiers to pelt the ionosphere and splatter colleagues on adjacent frequencies. Relatively low power indeed seems to be the general pirate practice, and I have heard plenty of stations saying that they were using ten watts or so as they worked into and out of Ireland, Britain, and the western reaches of the European mainland.

Occasionally they can be heard in mutual experiments trying out different levels, rolling the power back to ten watts and below if their transceivers will allow, and then pumping things up to fifty and beyond for normal operation. I do not think that working with a hundred watts is the norm.

To compensate for the meagre power that is allegedly used, the pirates regularly tweak the

quality of their audio inputs. It is quite a habit, if not a real hang-up with some of them. They fiddle with the responses of microphones, switch voice-compressors on and off, and using equalizers they add or subtract bass or treble to the audio.

Up to a point it is reminiscent of what lots of licensed hams do to optimize intelligibility above atmospheric noise and propagation difficulties. But no one could agree with that assessment when a true bass-loving bandido comes on air. The one purpose in his radio life is to sound as deep and richly plummy as a BBC announcer of yesteryear. It is common for other pirates who are working from vehicles to ask a bass-enthusiast to sharpen up his audio, because a decent but over-bassy communication can be indecipherable among the ambient noises in a moving vehicle. This chasing after the big bass quality is not a thing that legal operators pursue, but it is an on-going passion with a section of the pseudo-hams.

The ITU and the Future

It appears that the “Echo Charlies” on “45” picked their band with a degree of aplomb. In that particular slot, it is quite rare at my location to hear any legally-entitled voice or data traffic around their chosen set of frequencies. The only voice stations logged by this SWL last summer were as follows: North Atlantic Air Traffic Control (Shanwick / 6622 and New York / 6640 kHz USB), South East Asian VOLMET (Bangkok / 6676 kHz USB), and UK Royal Air Force (aircraft / 6697 kHz USB). Such loggings were few and far between. Any other traffic heard was either out-of-band maritime activity (Spanish and Scottish fishermen) or the pirate hams themselves.

Under favorable circumstances, Long Distance Mid-Eastern and African ATC could be expected to appear, and also some US Air Force traffic. This part of the radio spectrum is specifically set aside for mobile aeronautical use, e.g. 6525 - 6685 kHz is reserved for communications involving aircraft which are using national and international civil air routes (designation “R”), and 6685 - 6765 kHz is the preserve of aircraft which are outside the aforementioned routes, flying so-called “off-route” (designation “OR”). The latter normally are military aircraft.

In the year 2000, the International Telecommunications Union (ITU) set up a study group to report on interference by unauthorized users to aeronautical and maritime mobile services in the shortwave bands. The ITU expressed the view that interference was on the increase and that it was extremely difficult to monitor and control. It was concerned about the risk to Distress-And-Safety channels and believed that shortwave would remain a medium for such traffic in the foreseeable future.

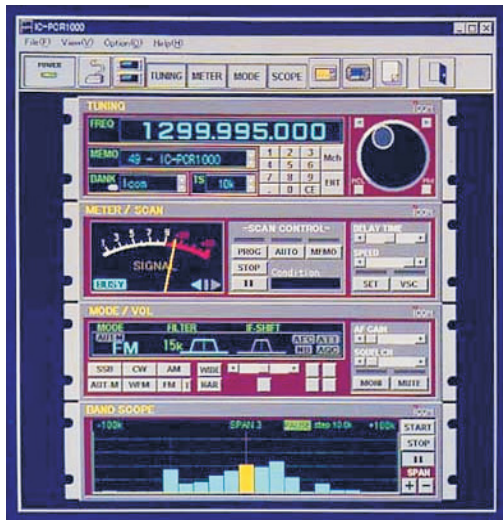
The general thrust of the study, due for completion by the end of 2001, is towards “technical solutions for the mitigation of interference.” Developing and implementing those “solutions” will be another matter. It looks like the European “45” buccaneers can look forward to many days and nights of plying the airwaves yet.

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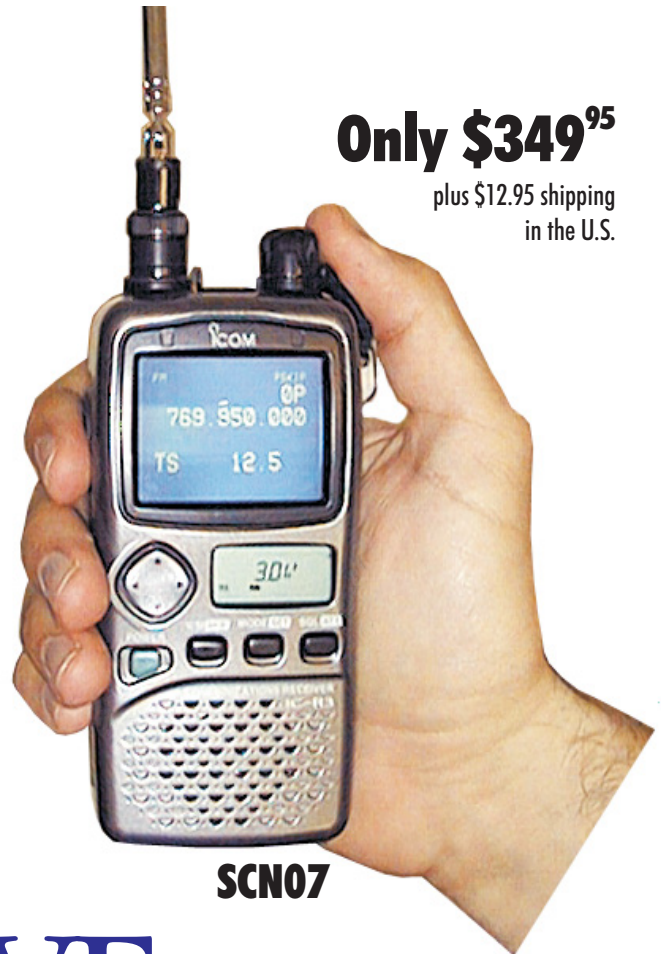
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Road Trip: Massachusetts to Dallas - Part 2

By John Mayson

Last month we journeyed down I-84 through a section of Massachusetts, Connecticut, and New York, then caught I-81 from Pennsylvania all the way into Jefferson County, Tennessee. This month we will pick up I-40 starting in Sevier County and travel to Little Rock, Arkansas, where we'll catch I-30. Hope you slept well and chowed down. Now fasten your seat belts and get those scanners ready for the trip. (See sidebar last month about traveling with scanners.)

Interstate 40

TENNESSEE

Sevier County

Sevier County is home to Dollywood, Gatlinburg, and part of the Great Smoky Mountains National Park.

Sevier County Law Enforcement

Sevier County Sheriff's Office	460.025	
Gatlinburg Police Department	460.250	
Pigeon Forge Police Department	460.050	Dispatch
Pigeon Forge Police Department	460.200	TAC
Sevierville Police Department	460.075	



Sevier County Fire Departments

Gatlinburg Fire Department	453.850
Pigeon Forge Fire Department	155.745/153.740
	127.3
Pigeon Forge Fire Department	154.175
Sevierville Fire Department	460.625

Great Smoky Mountains National Park

Output	Input	PL	Usage
167.150	166.350	173.8	Park Headquarters and Ranger Station

Knox County

Knox County operates a Motorola Type III trunked radio system and is used by the county, Knoxville, and the University of Tennessee.

Frequencies: 856.2125, 856.7125, 857.2125, 857.7125, 858.2125, 858.7125, 859.2125, 859.7125, 860.2125, 860.7125 MHz

Fleet map: s0, s0, s12, s12, s3, s11

Knox County Sheriff's Office

Subfleet	Usage
400-01	Patrol
400-02	Car-to-car
400-03	Records
400-04	Administration
400-05	Narcotics
400-06	SWAT
400-07	Organized Crime
400-08	Organized Crime
400-09	Narcotics
400-10	Narcotics
400-11	Car-to-Car
400-12	Car-to-Car
400-13	Car-to-Car
400-14	Special Events

Knoxville Police Department

Subfleet	Usage
200-01	East Patrol

200-02	Central Patrol
200-03	West Patrol
200-04	Detectives
200-05	Records
200-06	Car-to-car
200-07	Administration
200-08	Animal Control
200-09	Car-to-car
200-10	Car-to-car
200-11	Car-to-car
200-12	Car-to-car
200-13	
200-14	Special Events

Knoxville Fire Department

Subfleet	Usage
700-00	Fleetwide
700-01	
700-02	
700-03	
700-04	
700-05	Dispatch
700-06	
700-07	
700-08	Supervisors
700-09	Inspectors
700-10	Dispatch
700-11	Fire #1
700-12	Fire #2
700-13	First Respond
700-14	First Respond
700-15	Haz-Mat

University of Tennessee Police Department

Talkgroup	Channel	Usage
2320	A	Dispatch
2352	B	Car-to-Car
2384	C	Admin
2416	D	Admin
4112	F	Special Events

Loudon County

Loudon County Sheriff's Office 460.400, 460.450, 460.500
 Loudon Fire Department 453.550

Roane County

Roane County Sheriff's Office 460.150, 460.400

Cumberland County

As we cross into Cumberland County, we cross into the Central Time Zone. Please put down the magazine and set your watches back one hour. Thank you.

Cumberland County Sheriff's Office 155.070/155.910
 Dispatch

Cumberland County Fire Department 154.250/153.950
 Dispatch

Putnam County

Putnam County Sheriff's Office 154.755, 155.655
 Putnam County Fire Department 154.130/153.770
 Dispatch

Smith County

Smith County Sheriff's Office 155.625/154.800
 Dispatch

Wilson County

Wilson County Sheriff's Office 151.190, 153.860,
 154.845, 155.790,
 160.110

Davidson County

Nashville-Davidson County uses a Motorola ASTRO digital trunked radio system. At present there are no scanners capable of demodulating the signals into something a human can understand. Be patient, Uniden is working on it.

We offer you the system's frequencies you can enjoy digital buzzing during your stay in the Nashville area.

Frequencies: 856.2625, 856.4875, 856.7125, 856.9875,
 857.2625, 857.4875, 857.7125, 857.9875, 858.2625,
 858.4875, 858.7125, 858.9875, 859.2625, 859.9875,
 860.2625, 860.7125, 860.9875 MHz

Williamson County

Williamson County Sheriff's Office

Freq	Usage
460.500	Dispatch
460.400	

Dickson County

Dickson County Sheriff's Office 460.050

Hickman County

Hickman County Sheriff's Office 460.300

Humphreys County

Humphreys County Sheriff's Office 460.100

Benton County

Benton County Sheriff's Office 460.175

Decatur County

Decatur County Sheriff's Office 460.225

Henderson County

Henderson County Sheriff's Office 460.200

Madison County

The city of Jackson operates a Motorola Type II analog TRS that is used by all city services and also by the county.

Jackson TRS

Motorola Type II analog
 856.2625, 856.7625, 857.2625, 857.7625, 858.2625,
 858.7625, 859.2625, 859.7625, 860.2625, 860.7625 MHz

Madison County Sheriff's Office

Talkgroup	Usage
16816	Dispatch

Madison County Fire Department

Talkgroup	Usage
16432	Dispatch
16464	Mutual Aid

Jackson Police Department

Talkgroup	Usage
16048	Dispatch
16080	Records
16496	Dispatch 2
16560	Admin
16592	Special Operations
16624	Tactical
16752	Mutual Aid
16784	Channel 2
16848	Channel 4
16880	Channel 5
16912	Channel 6

Jackson Fire Department

Talkgroup	Usage
16016	Dispatch
16112	Tactical 1
16144	Tactical 2
16176	Tactical 3
16240	Command
16272	Arson investigations
16336	Airport

Jackson EMS Department

Talkgroup	Usage
16304	EMS Dispatch

Haywood County

Haywood County Sheriff's Office 453.625

Fayette County

Fayette County Sheriff's Office 460.275

Shelby County

Shelby County operates a digital EDACS trunked system with six sites. In the name of incompatibility, Memphis uses rival Motorola for their communications needs. Unfortunately for Memphis residents, the particular system Memphis uses is not APCO-25 compliant, meaning the upcoming Uniden digital scanners will be useless.

While traveling through the Memphis area I noted none of the Shelby County talkgroups were digital. According to Lindsay Blanton's web site <http://www.trunkedradio.net>, they can go to digital at any time. Remember when programming an EDACS system into your scanner, the frequency order matters.

**Shelby County TRS****EDACS**

North site: 1=856.2125, 2=857.2125, 3=858.2125,
 4=859.2125, 5=860.2125 MHz
 South site: 1=866.4250, 2=867.0500, 3=867.3250,
 4=867.6750, 5=867.9375 MHz
 Redwood: 1=866.3125, 2=867.2125, 3=867.5625,
 4=867.8375, 5=868.4125 MHz
 Germantown: 1=867.4125, 2=867.7375, 3=868.6250,
 4=868.9125 MHz
 Millington: 1=866.3000, 2=867.6875, 3=868.5375,
 4=868.8875 MHz
 Northeast Memphis: 1=867.6125, 2=867.9875, 3=868.6625,
 4=868.9375 MHz

Shelby County Sheriff's Office

AFS	Usage
02-041	Dispatch
02-042	Car-to-Car
02-043	Records

Miscellaneous

AFS	Usage
02-126	Unknown Law Enforcement
02-082	Unknown Law Enforcement
02-127	Unknown Law Enforcement
02-081	Unknown Law Enforcement
02-093	Unknown Law Enforcement
02-131	Unknown Fire Department

Memphis TRS**Motorola Digital**

Site 1: 855.4625, 856.2375, 856.4375, 856.4625, 857.2375,
 857.4375, 857.4625, 858.2375, 858.4375, 858.4625,
 859.2375, 859.4375, 859.4625, 860.2375, 860.4375, 860.4625
 MHz
 Site 2: 856.7125, 856.9375, 856.9625, 857.7125, 857.9375,
 857.9625, 858.7125, 858.9375, 858.9625, 859.7125,
 859.9375, 859.9625, 860.7125, 860.9375, 860.9625 MHz

Law enforcement, fire, and EMS talkgroups all appear to be below talkgroup 4096 and all are digital. Public works talkgroups all appear to be above 40000 and are analog.

ARKANSAS

We now enter Arkansas, the last state we will visit along I-40. The Arkansas State Police operates a statewide Motorola Type I TRS. I have seen on the Internet several guesses as to the system fleetmap, but s13, s6 worked just fine. The frequencies are listed under the counties. For those of you who own Uniden BC780s and wish to take advantage of the control channel only mode, the 860.xxxx MHz frequencies are the only ones used as the control channel.

Arkansas State Police TRS

Subfleet	Usage
000-00	Dispatch
000-01	Dispatch
000-03	Administration
000-04	Investigations
000-05	Tac 1
000-06	Tac 2
000-15	Car-to-Car
400-09	Sheriff's Link

Crittenden County

Crittenden County Sheriff's Office

Freq	Channel
37.16	1
37.24	2

Arkansas State Police TRS 856.8125, 857.8125, 858.8125, 859.8125, 860.8125

Saint Francis County

Saint Francis County Sheriff's Office 154.785, 159.150

Monroe County

Monroe County Sheriff's Office 37.04, 37.20, 37.24

Prairie County

Arkansas State Police TRS 856.9875, 857.9875, 858.9875, 859.9875, 860.9875

Lonoke County

Arkansas State Police TRS 856.8125, 857.8125, 858.8125, 859.8125, 860.8125

Pulaski County

Little Rock operates a Motorola Type II analog TRS that is also used by the county and some surrounding cities.

Little Rock TRS

Motorola Type II analog

Frequencies: 856.2125, 856.2625, 856.4375, 856.4875, 856.7125, 857.2125, 857.2625, 857.4875, 857.7125, 858.2125, 858.2625, 858.4875, 858.7125, 859.2125, 859.2625, 859.4875, 859.7125, 860.4375, 860.4875, 860.7125

Little Rock Police Department

Talkgroup	Usage
16	Dispatch
48	Channel 8
80	Channel 9
112	Common
176	Administration
240	Detectives
624	SWAT
12848	Special Events
58368	Link to State Police

North Little Rock Police Department

Talkgroup	Usage
48624	Primary
48626	Secondary
48656	Secondary

Shannon Hills Police Department

Talkgroup	Usage
12816	Dispatch

Sherwood Police Department

Talkgroup	Usage
49904	Primary
49936	Secondary

Pulaski County Sheriff's Office

Talkgroup	Usage
44080	North Primary
44112	North Secondary

Little Rock Fire Department

Talkgroup	Usage
6416	Dispatch

6448	Fireground 1
6480	Fireground 2
6512	Fireground 3
6608	Hazmat
6640	Bomb Squad
6672	Fire Rescue

Little Rock Fire Department

Talkgroup	Usage
48368	Dispatch
48720	Channel 4
48848	

Arkansas State Police

Site 1: 856.7625, 857.7625, 858.7625, 859.7625, 860.7625
Site 2: 856.9375, 857.9375, 858.9375, 859.9375, 860.9375

Interstate 30

Having traveled across I-40 from the Great Smoky Mountains of Tennessee west into Little Rock, we catch I-30 and travel its entire length into Fort Worth.

Saline County

Saline County Sheriff's Office 153.875, 154.890, 155.310, 156.210

Saline County Fire Department 156.195, 155.145

Hot Spring County

Hot Spring County Sheriff's Office 156.030/154.935
Arkansas State Police TRS 856.9875, 857.9875, 858.9875, 859.9875, 860.9875

Clark County

Clark County Sheriff's Office 154.770, 155.700, 159.270

Arkansas State Police TRS 856.7625, 857.7625, 858.7625, 859.7625, 860.7625

Nevada County

Nevada County Sheriff's Office 154.860/159.150
Arkansas State Police TRS 856.4625, 857.4625, 858.4625, 859.4625, 860.4625

Hempstead County

Arkansas State Police TRS 856.3125, 857.3125, 858.3125, 859.3125, 860.3125

Miller County

Bi-State Public Safety TRS 856.2375, 857.2375, 858.2375, 859.2375, 860.2375

Arkansas State Police TRS 856.8875, 857.8875, 858.8875, 859.8875, 860.8875

Miller County Sheriff's Office 155.580

TEXAS

Welcome to the Lone Star State. We're in the home stretch and will be at our final destination by the end of this article. Thanks for riding along with us.

Texas Department of Public Safety

Base	Mobile	CTCSS	Chan	Description
155.460	154.680	162.2	1	Mobile to Base A



155.460	155.460	162.2	2	Mobile to Mobile A
154.950	154.950	CSQ	3	Intercity Mobile
154.950	155.370	CSQ	4	Intercity Base
154.680		162.2	5	Channel 1 Mobile Receive
154.695		162.2	6	Channel 8 Mobile Receive
155.445	155.445	162.2	7	Mobile to Mobile B
154.695	155.445	162.2	8	Mobile to Base B
159.210	159.210	162.2	9	Mobile to Mobile C
154.665	159.210	162.2	10	Statewide Repeater
154.665	159.210	107.2	11	Statewide Repeater
154.665	159.210	110.9	12	Statewide Repeater
154.665	159.210	118.8	13	Statewide Repeater
154.665	159.210	123.0	14	Statewide Repeater
154.665	159.210	127.3	15	Statewide Repeater
154.665	159.210	136.5	16	Statewide Repeater
154.665	159.210	141.3	17	Statewide Repeater
154.665	159.210	146.2	18	Statewide Repeater
154.665	159.210	151.4	19	Statewide Repeater

Bowie County

Bi-State Public Safety TRS	856.2375, 857.2375, 858.2375, 859.2375, 860.2375
Bowie County Sheriff's Office	154.815

Morris County

Morris County Sheriff's Office	154.875
Morris County Fire Department	154.430

Titus County

Titus County Sheriff's Office	154.755
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Franklin County

Franklin County Sheriff's Office	155.580
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Hopkins County

Hopkins County Sheriff's Office	155.130 (151.4)
Hopkins County Fire Department	460.625

Hunt County

Hunt County Sheriff's Office	155.835/153.875
Hunt County VFD	154.010

Rockwall County

Rockwall County Sheriff's Office	158.865
Rockwall County Fire Department	154.205

Dallas County

I-30 passes through two Dallas County communities: Mesquite and Dallas. Mesquite is on a trunked system, while Dallas uses UHF for police and fire.

Dallas Police Department

All frequencies use a PL tone of 173.8 Hz

Freq	Channel	Description
460.325	1	Central and East Patrol
460.375	2	Northeast Patrol
460.500	3	Southeast Patrol
460.425	4	Southwest Patrol
460.075	5	Northwest Patrol
460.175	6	North Patrol
460.275	7	Traffic
460.125	8	Tactical
460.025	9	Tactical
460.225	10	Car-to-Car
460.475	11	CID
460.400	12	Car-to-Car

Dallas Fire Department

Freq	PL	Channel	Description
460.575	CSQ	0	Dispatch

453.875	D131	1	Fire Response
453.900	D131	2	MICU Response
451.150	D131	3	Major Incident Fireground
453.675	D131	4	Admin

Mesquite TRS

Motorola Type II

856.3375, 857.3375, 858.3375, 859.3375, 860.3375 MHz

Mesquite Police Department

Talkgroup	Usage
592	Dispatch
624	Dispatch
656	Information
688	Talk
720	Talk
752	TAC
784	Talk

Mesquite Fire Department

Talkgroup	Usage
48	Fire 1
80	Fire 2
112	Investigators
176	Fireground 1

Tarrant County

The city of Fort Worth operates, without exaggeration, the largest and busiest trunked radio system in the known universe. Okay, that might not be true, but it is a very active system used by Fort Worth, Tarrant County, and many of Fort Worth's suburbs. Because this article is not intended to be an exhaustive list of frequencies and talkgroups, we will list only the high-lights of the system. If you'd like to learn more about the system, please visit <http://www.trunkedradio.net/>.

Fort Worth Public Safety System

Motorola Type II

Frequencies: 866.1625, 866.2125, 866.2875, 866.3625, 866.3875, 866.6625, 866.6875, 866.7125, 866.8375, 866.8875, 867.1625, 867.2125, 867.2625, 867.3375, 867.3875, 867.6625, 867.7125, 867.7625, 867.8375, 867.8875 MHz



Arkansas State Police Troop D HQ - Forrest City

Fort Worth Police Department

Talkgroup	Usage
2992	North Patrol
2448	South Patrol
2160	East Patrol
2704	West Patrol
3248	Central Patrol
3536	Traffic
4464	Traffic Talk
4496	Traffic Talk

Fort Worth Fire Department

Talkgroup	Usage
1808	Dispatch
1840	Structure Fires
1872	Fireground
1904	Fireground
1936	Fireground
1968	Fireground

Tarrant County Sheriff's Office

Talkgroup	Usage
8432	Patrol
8784	Talk

The city of Arlington also operates a Motorola trunked radio system. Arlington is home to Six Flags Over Texas and the Texas Rangers Major League Baseball team. But that will have to wait for another day. Time to turn in; I'm bushed!

Arlington Public Safety

Motorola Type I/II (s4, s11, s12, s12, s11)

Frequencies: 856.4875, 856.7125, 857.4875, 857.7125, 858.4875, 858.7125, 859.4875, 859.7125, 860.4875, 860.7125 MHz

Arlington Police Department

Subfleet	Usage
200-01	North Patrol
200-02	West Patrol
200-03	East Patrol
200-04	Information
200-05	North Talk
200-06	West Talk
200-07	East Talk
200-08	Supervisors
200-09	CID
200-10	Tac 1 Narcotics Ops
200-11	Tac 2 SWAT
200-12	Tac 3 SWAT
200-13	Tactical
200-14	Tactical
200-15	Tactical

Arlington Fire Department

Subfleet	Usage
100-01	Dispatch
100-02	Fireground
100-03	Fireground
100-04	Fireground
100-05	Training
100-06	Administration
100-07	EMS
100-08	
100-09	
100-10	Talk
100-11	
100-12	
100-13	
100-14	
100-15	

Small Dish vs Big Dish: A Satellite TV Primer

Here are some quick facts to bring you up to speed regarding satellite television. All broadcast TV satellites are in *geostationary* orbit around the earth. Because they are stationed some 23,000 miles above the equator, these satellites appear not to move. Each is in an assigned *orbital slot* so that, when you aim a dish at a particular satellite's assigned location, it will be there.

Big dish satellite TV uses a big dish because the satellites used are transmitting in the C-band range (3-4 GHz) at relatively low power (16-20 watts). Because you need as much gain as possible to get a noise free picture, you need a larger dish. Small dish satellites transmit in the Ku-band range (11-12 GHz) and at comparatively higher power (up to 200 watts).

The small dish satellites transmit directly to the intended user, the home viewer: hence the term *Direct Broadcast Satellite* (DBS). The other satellites transmit primarily to the nation's cable-TV companies for retransmission on their cable lines, whether coaxial or fiber optic. The same cable fare which is broadcast on the DBS satellites is originally received from the C-band satellites and retransmitted to the DBS birds.

The small dish satellites transmit entirely digital signals while the C-band satellites transmit a wide variety of analog and digital signals using a number of encryption schemes. Networks, syndication companies, sports broadcasters and news crews routinely use C-band for daily transmissions. Many are analog and unencrypted while others are analog, encrypted. Still others are digital, unencrypted, and some are digital, encrypted transmissions. Those digital C-band signals which are unencrypted, or *Free-To-Air* (FTA) require an additional receiver which can receive such signals.

Between the two DBS services, DirecTV® and DISH Network®, there are many apparent similarities. However, the two services are incompatible. If you subscribe to DISH Network and decide to switch to DirecTV you will be required to buy a separate DirecTV system.

On C-band all receivers are able to tune

in analog C-band signals, but to receive digital C-band signals you'll need a different digital receiver. C-band digital services transmitting in the DigiCipherII® (DCII) mode can be tuned using Motorola's 4DTV® receiver. C-band digital services transmitting in the MPEGII FTA digital mode must be tuned on yet another receiver.

pay the minimum amount for the system and you are free to sign up for the minimum channel package. It pays to shop around.

DISH Network has its own receiving systems which they build themselves under the EchoStar® brand. DirecTV has licensed the construction and sales of their systems through the usual major electronics players such as Sony® and RCA®. At one point there were dozens of companies making and selling their own brand of DirecTV receiver system, but cutthroat competition has driven most of them out. Basic systems typically cost \$150-300 with introductory systems sold to new subscribers only for \$50.

You have to pay attention to what you're getting when you buy a small dish system, and there are a bewildering number of add-ons to keep track of. For independent viewing in another room you'll need another basic receiver (\$80). An RCA receiver with the surround sound will cost \$200 by itself. Controlling live video is another luxury add-on available on both systems. DirecTV uses TIVO® and Microsoft's UltimateTV®. Expect to pay an additional \$200-300 for this plus a monthly charge. DISH Network offers a DishInteractive® service which will also be an additional \$200 over the basic system

and monthly fee. Then there's the HDTV option. HDTV-ready DISH Network systems cost \$700. Off-Air HDTV tuners cost another \$150. You'll still need an HDTV TV set to appreciate the full effect of HDTV (add another \$1,500-3,000).

DirecTV also offers high-speed Internet service with DirecPC®. It offers speeds up to 400 kbps, access to the Web, e-mail accounts, etc. Service pricing is done in tiers ranging from \$20-50/month. Systems using the high-speed Internet option must be professionally installed (add another \$200).

◆ Getting Started with the Big Dish

The cheapest way to get started in C-band is to get a used system from someone who's



DISH Network Satellite TV system. Small dish, big entertainment.
(Courtesy EchoStar Communications)

◆ Cost of Getting Started

It's possible to get a basic small dish system very cheaply. Of course, the catch is that you have to sign up for the program package for a minimum time (usually a year), and that could cost from \$300 to \$700 per year depending on the package of programming you sign up for. Some dealers sell systems at drastically reduced prices and throw in a month or so of free programming. Other dealers offer discounted systems and free installation if you'll sign up for a full year of a premium subscription package. Usually big promotions are mounted just before the football season.

The cheapest way to buy a small dish system is to make the purchase at a major discount electronics store like Best Buy or Circuit City, and do the installation yourself. This way you

just bought into the small dish system. They'll be happy if you just take the thing away. They'll be thrilled if you'll pay them \$50 or \$100. Tens of thousands of these orphan systems are standing in disuse just waiting to be transplanted into your yard. However, unlike the small dish systems these big dishes are a little trickier to install. If you don't know how or don't want to learn, ask a pro to do it for you for about \$200. Once the system is up and running you can watch all the "in the clear" video for free. To access cable fare you'll need a VideoCipherII (VCII) descrambler module in the receiver (\$50-150 used) and pay only for the channels you want to watch.

The most expensive way to get into C-band is to buy a new complete system from your local dealer and have him install it. Expect to pay \$1,500-2,000, depending on the receiver. Total channel package subscriptions for C-band can cost \$65/month, but with ala carte pricing you can subscribe to only those channels you want and end up paying under \$10/month.

If you're only interested in getting generic cable-TV fare, consider setting up a "G5 System." That's a stationary C-band dish without an actuator motor (dish mover), aimed at the Galaxy 5 satellite. With an LNB feedhorn (no moving parts) and a good used receiver with VCII module, you'll get about 15 basic cable services for about \$15/month. Is anyone else still paying that little for basic cable? It's a no-frills system for folks who just don't need a lot.

There are only a few C-band receiver companies still making C-band equipment. Most new receivers on the market are New Old Stock (NOS) and are available at quite a discount from when they were first made. The only receiver with any future in C-band is Motorola's 4DTV. When originally introduced some 5 years ago it cost \$1,200. They currently sell for as low as \$850 with refurbished units going for \$200 less.

To access the hundred plus channels of MPEGII video and audio available on C-band but not receivable with a standard analog or 4DTV receiver, all you'll need is to add an MPEGII receiver. Used in a "slave" configuration with your analog C-band system these receivers can pick up dozens of sports channels, international broadcasts, and esoteric transmissions such as USIA's World Net and their VOA programming. The receivers typically cost \$200-300 and have their own remote control. You'll be required to do a certain amount of programming of these receivers in order to tune in the FTA MPEGII offerings, but it's time and money well spent.

◆ Bottom Line Considerations

For many MT readers there's not going to be much choice in which system you install. If you're in a location where a big dish is imprac-



Big Dish system with Motorola's 4DTV receives it all. (Photo courtesy of WOLMD)

tical or not allowed, you'll have to choose between the DirecTV and DISH systems. But you should be aware that DISH and DirecTV have been engaged in merger talks for the last couple of months and that could have an impact on future subscribers. If DISH is successful, they plan to swap out the DirecTV systems for theirs (remember they're incompatible) and use DirecTV's satellites to transmit even more local TV stations spot-beamed to their respective areas. Of course, with a solid monopoly on the DBS market, it's not unreasonable to expect sharp increases in their subscription fees.

Without the merger it's difficult to say what the future is for DirecTV. Even though they reported their best quarter yet in the last quarter of 2001, they are plagued by a piracy problem which has them missing out on huge numbers of subscribers. Some dealers estimate that 60% of DirecTV systems in their area are using hacked boxes (possession and distribution of which is illegal). The problem is that, if you sell a \$300 satellite system for \$50, banking on the customer becoming a long term subscriber but who instead buys a hacked "smart card" and watches it all for free, you have to make up for that loss somehow.

DISH Network also has a piracy problem, but it is said not to be as severe as DirecTV. However, not all is rosy in DISH land. DISH Network dealers fear that they'll be squeezed out of the equation once the merger takes place. It was the DISH Network dealers who built much of the subscriber base DISH now enjoys. They were, for the most part, the original C-band dealer network which convinced millions

of C-band customers to switch to DISH and were paid a healthy "bounty" by DISH Chairman and self-styled satellite guru, Charlie Ergen, for each new subscriber they brought in.

Even though C-band's dwindling numbers suggest an end to that part of the satellite TV industry, insiders continue to insist there's plenty of life left in the C-band service. Current C-band cable satellites have 10 to 15 years lifetime and cable companies will continue to receive their programming via C-band, which will continue to use the VideoCipherII encryption system which has not been hacked. And, finally, big dish systems offer a real opportunity to learn about satellite technology and to experiment, particularly with the interesting transmissions happening on the satellites bridging the Atlantic.

MORE INFORMATION

For more on satellite TV reception contact the following:

Big dish satellite systems: Skyvision 800-500-9275 or <http://www.skyvision.com>

Big dish ala carte programming prices: <http://www.lstar.com/alaarte.htm>

MPEGII receivers and systems:

<http://www.DVBExpress.com>

DirectTV:

<http://www.directv.com>, or your local Radio Shack store

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<http://www.dishnetwork.com> or call 800-333-3474

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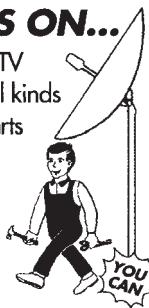
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Q. Are home-built regenerative receivers capable of pulling in stations as well as a costly communications receiver? (Roger Henderson, Memphis, TN)

A. If signal strength were the only criterion, yes. But the real answer is, "Not by a long shot!" Simple regenerative receivers, invented at the beginning of the 20th Century by Lee DeForest, are nothing more than preamplified detectors; they have a tuned circuit to allow the signal(s) to peak a general portion of the spectrum, then feed back a portion of that signal to be re-amplified for an additional boost.

The result is a barn door of signals with little selectivity; you will hear the strong stations, but the weak ones are lost in the background din. Regens were early stages in the evolution of the modern receiver.

The invention of the superheterodyne circuit by Major Armstrong in 1918 provided much-needed selectivity – single-signal reception – dismissing the regen permanently except as a historical curiosity, and as a toy for home experimenters looking for a weekend project.

Coincidentally, Armstrong also improved DeForest's regenerative detector by developing a much "hotter" super-regenerative receiver, still a popular project for VHF/UHF experimenters.

Q. What is the "Yoink-Yoink-Yoink" sound I hear on SSB shortwave frequencies like 4827 and 4910 kHz? (Mark Burns, Terre Haute, IN)

A. You are probably hearing either Automatic Link Establishment (ALE) or the U.S. Navy's Link 11. Both are automatic digital exchanges of information.

ALE is widely used over the HF spectrum by military, government, civilian, and other users to establish the best frequencies for communications. Rather than the two ends of the circuit having to try to find each other at different times and under different propagation conditions, ALE is repeatedly polling all participants in the circuit to determine the most reliable path at any time.

Link 11 is a method by which hard tactical information, such as ship radar targets, can be seen and shared by any other Navy unit needing to acquire it.

Q. What are the Spanish-language numbers transmissions, spoken by a woman, that I hear on several

shortwave frequencies? (Michael Donald Choleva, Cleveland, OH)

A. These are the notorious "spy-numbers" stations that have generated much debate for decades. MT blew the lid off these in the mid-1980s when they were traced to several key government installations in Germany, Cuba, Israel, the U.S., and elsewhere. Subsequent news stories revealed more details.

They are routine broadcasts intended for reception on a simple shortwave portable without raising suspicion in the host country where the agent is listening. Messages are sent using a "one-time pad," a dated notebook page which is discarded and substituted with a new coded page every day.

The messages are simple, "Meet your contact tomorrow at the appointed time" sorts of things for conducting day-to-day espionage.

Q. On a longwire antenna, are the signals best received broadside to it, or off the ends? And does it make a difference whether it's fed at the center or not? (Harvey Bell, email)

A. First, let's correct the term "longwire." This actually means a wire that is longer than a full wavelength. I think you mean "dipole" or "random wire" antenna. It doesn't matter where you feed the antenna; the pattern remains the same assuming you use the correct technique (balanced twin lead or unbalanced coax as appropriate).

A half-wave dipole receives best broadside to the wire, and minimally off the ends. However, the longer the antenna is from a wavelength standpoint, the more the lobes (best directions) start to migrate toward the ends of the wire, and less perpendicular to the wire. This is actually an advantage in planning the suspension of the antenna.

For example, a 66-foot wire (40 meter dipole) receives best off the sides below about 10 MHz, but starts exhibiting the multi-lobing pattern at higher (DX skip) frequencies.

Looking at a world globe, stretch a string from your location to the various points of listening interest. The closer targets will be most likely heard at the lower frequencies anyway, so they should be approximately broadside to the wire, while distant DX will be heard on the higher frequencies, so they can be received at off-angles.

Think of the higher-frequency pattern as a four-leaf clover, with the four notches at the ends of the wire and perpendicular to the sides of the wire. This approximates the most favorable directions.

Q. Does long-term storage of radios or earphones have a destructive effect? (MDC, Euclid, OH)

A. It depends upon the conditions. Heat, dust, moisture, fumes, mold, and other environmental factors can contribute considerable degradation. Potentiometers (volume and tone controls), variable tuning capacitors, and switches all suffer from conditions which can degrade their electrical continuity, leading to scratchy and erratic performance.

Some circuit components like paper and aluminum electrolytic capacitors decompose over time, gradually becoming more like resistors.

The simple answer is that electronic equipment should be used and not stored, and kept in human-tolerable temperatures, at low humidity and in a clean environment.

Q. I would like to connect an external speaker to the earphone jack on my radio. Are there any problems I should anticipate? (Gerald Silver, Tamarac, FL)

A. It is generally possible to simply plug an external speaker into the earphone jack on any radio. If the radio is a stereo set, requiring a stereo headset, then you will need to include a stereo/mono adaptor plug between the jack and the speaker plug. These are readily available from Radio Shack and often from audio departments of chain stores as well.

Try to select a large-diameter speaker with a large magnet to provide the best efficiency. Impedance is a judgment call, and while any 4-16 ohm speaker should work fine, I'd recommend one with the higher impedance to avoid excessive current loading on the radio's audio output stage.

You will do no harm to the radio by hooking up the speaker and trying it out. If, when turning up the volume, the sound gets badly distorted, then the radio simply can't deliver the power required by the external speaker and you will need an amplified speaker.

Questions or tips sent to Ask Bob, c/o

MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.monitoringtimes.com

Getting Started

Bright Ideas

Gary Webbenhurst

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We start this month with two ideas sent in by Matthew Stanley, Monitoring Station KVA4ES. My apologies to Matthew as he sent these in a while ago, and this is the first opportunity I had to incorporate them into the column. Here they are verbatim.

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"Mouse pad - it's not just for PCs anymore. Living in an apartment, I do not have room for a dedicated 'shack'; thus, my radios are spread over several locations, including desks, nightstands, dressers, etc. Since my radios share space with other household items (clocks, books, bills, etc.) as well as the usual accoutrements of DXing - logs, books, maps, charts, etc., - I find myself sliding my radios around on a regular basis.

"Lo and behold, I have discovered that PC mouse pads, when flipped over, provide a terrific, slidable surface for my radios. When flipped, the rougher bottom surface holds the radio in place while the smooth mouse side enables movement to the desired position. Simply place the radio, flip stand out, on the 'rough' side of the pad, with the antenna, and power cables doubled back under and out the other side. (This anchors the cables and saves wear and tear on the jacks). This works well for my Sangean ATS-909 and Sony ICF-2010, and should work for just about any portable radio serving as a tabletop receiver."

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"Hourly notebook: The last thing any DXer needs is another notebook, but I find that this idea helps consolidate and eliminate a lot of the papers that I tear out of magazines, or print from the Internet (station info, frequencies, etc.), and end up toting around everywhere. I have a stenographer's notebook, with each page marked, in order, for a particular hour on the UTC scale (0000 on the first page, 0100 on the second and so on). In this notebook, I list those elusive stations or countries I am still trying to log.

"Now, instead of printing out Glenn Hauser's entire DXLD report and using a highlighter to mark all of the stations I am targeting, I just jot down their name and frequency on the appropriate hourly page (e.g., Germany, Bayerischer Rundfunk, 6085). For stations with broadcasts longer than one hour, I just cross-reference, e.g., 'Cuba, R. Rebelde, see 0200 UTC' rather than writing out all the frequencies again. Of course, a similar scheme could be set up via frequency, with a different meter band on each page. But by using the UTC scale to arrange my DXing habits, I can plan ahead and set the timer on my radio to wake me up to that elusive logging!"

Ya gotta love an SWLer that dedicated. Well done, and thanks for your patience, Matthew.

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Time to plan for attending an upcoming summer airshow. This is must for all scanner buffs. It is truly a frequency rich environment. Take your frequency counter, your scanners, sunglasses, hat; the whole works.

The day before and the day after are also good possibilities, as many aircraft arrive, practice, and depart. Go to this website to check for an airshow in your area: <http://www.airshow.com/airshows.htm>. Check the March issue of *MT* or <http://www.monitoringtimes.com> for a schedule and list of frequencies used by the various air performance groups.

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Reader George Speck sends in a bright idea. He sent for the free FEMA-20 Publication List. It is available at: Catalog FEMA-20, P O BOX 2012, Jessup, MD 20794-2012 or, call them for free at 1-800-480-2520 (8-5pm Eastern Time). I sent for it. The catalog has many publications, as well as posters, videos, and camera-ready materials. If you are a volunteer (or paid) firefighter, EMS/Paramedic, or disaster responder, this is a gold mine. Apparently all the products are "free." Of course we as taxpayers actually paid for them. Don't abuse it.

There is also the Incident Command System (ICS) certification home study course available at <http://training.fema.gov/EMIWeb/is195.htm> or 1-800-561-3356.

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I stumbled across a new product from West Mountain Radio (<http://www.westmountainradio.com/RIGrunner.htm> or 203-853-8080.) It is a DC power distribution strip. In the photo you can see the easily replaced automotive fuses and the use of Anderson Powerpoles as quick connects to your accessory jumper cables. Up until now the only U.S. manufacturer making a DC power strip was MFJ.

Well, look out, MFJ, this new product is awesome. No more trying to thread a wire through a much too small hole, or wrapping wire around a binding post. The wires keep slipping, and the close proximity foretells a short circuit.

I can't afford to replace all my power strips, but the product made me think about how to retrofit the MFJ strips. I used six-inch lengths of wire



from the terminal poles (you know, the ones with the caps you can't remove), and on the ends I soldered Anderson Powerpoles. The housing then mates the black and red connectors together for foolproof operation. Why didn't I think of this before?

By now you are familiar with Gary's Law of Redundancy. So make certain you fuse the incoming master power cord from your battery or AC/DC power supply.

47

Attention hams! I have looked everywhere to find a source for those "T" connectors used on virtually all mobile ham radios these days. I hated to spend \$12 bucks just to get a new connector cable. Well, I finally found a source that sells just the connectors. I am now the happy owner of several new power cables. Now my mobiles can be quickly connected to other power sources and situations. Try <http://www.powerwerx.com> or 1-714-570-3303. They sell a package of 10 "T" connectors for \$19.90. (You just need the male plugs.)

They also sell Anderson Powerpoles (\$20 for a set of 25 Amp. connectors), and wire, etc. I also made up some DC power cords with Anderson ends. Anderson has become the standard ARES/RACES power connectors in many areas.

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As my radio collection grows, I make a three ring binder for the radio with the manufacturer's glossy info sheet, a list of programming commands, a cheatsheet, the expanded TX/RX modification, etc. I use the binders that have the clear see-through front cover. This allows me to personalize the binder with a professional looking cover. In my word processor I simply type the basic info, then center align it, and change the font to say, 48 points. I insert a large picture of the radio and expand it as large as I can to fit on one page. If you can't find a photo at the manufacturer's website, then check this website for radio pictures in JPEG format: <http://www.rigpix.com/>. Naturally, a color-printed image looks best.

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Here's a tip from Ted Gurley: try <http://www.angelfire.com/md/k3ky/page35.html>. At this site there are two sources listed that can aid SWLers in getting foreign postage and help on the QSL hunt. Another good website is: <http://drsm0ke.net/sbu/> for info on the BC-245 and the GRE Data Manager for the PRO-92. Thanks, Ted.

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Another great website for those lucky enough to own a Bearcat 780XLT: <http://members.accessus.net/~090/awh/bc-780xlt.html>

Keep listening and we will see you next month.

Scanning at Sporting Events

Sporting events present one of the best opportunities for diversified scanning, even if you're not a fan of the particular sport you're monitoring. The Olympics and seasonal events are covered on a regular basis by *Monitoring Times* because they're so diverse and radio-centric.

Professional football, baseball, basketball and hockey are easy to monitor in many large cities, and college teams abound at local stadiums and arenas. Each sport utilizes radios and presents hobbyists with unique monitoring challenges, not the least of which is having enough memory channels and time to sort out all the communications. If you're in a college town, your events will have (at minimum) some security, fire-rescue, facility maintenance and campus administration channels. These may be on any combination of trunked radio systems, VHF and UHF repeaters, simplex channels, or even low-power FRS or business band frequencies.

Larger cities with professional teams will have additional security and fire-rescue channels. Local police and fire agencies will often assign specific personnel and equipment to each sports team and even each side of the field in a stadium.

For the largest stadiums and arenas, public safety personnel are assigned geographically to establish consistent response times. Officers will be assigned to field positions, lower grandstand seats, upper grandstand seats, upper decks, skyboxes, press boxes, vendor areas, food courts, locker rooms, money rooms, the Stadium Manager's office, parking lots and surrounding roads. One contingent is usually assigned to posts inside the stadium (security), while another contingent handles external matters (traffic).

Many special units (and talkgroups on trunked systems) may be pressed into service. For example, bomb-sniffing dogs and handlers may conduct sweeps through the stadium before each game. Undercover units may be assigned to look for pickpockets or ticket scalpers. Stadium employees or contractors may complete maintenance and trash removal for many hours after an event. Well over 100 police officers, fire-rescue personnel and stadium workers may have radios in operation.

In addition to security, safety and facility management channels, the news media may have a variety of frequencies in operation. Blimps and V.I.P. helicopters may also require on-site air traffic control channels. If the event includes an international sports team, or if a dignitary is in attendance, federal law enforcement channels will

also be active.

Two of the most specialized and popular sports also use the most radios: golf and auto racing.

◆ On-Scene Commander: Golf and Cars

Each sporting event has a particular patronage and atmosphere, and this fact relates directly to on-site radio utilization. Professional golf tournaments are geographically spread out and require instant communications for scoring and camera cues. Patron services, catering and transportation are important communication elements and hundreds of volunteers are on-site for event support.

An auto race, conversely, is more about the drivers and race teams and less about the patrons in terms of radio use. Law enforcement, safety, facility management and vendors are certainly in place, but the race teams themselves have more radio channels than all the supporting services combined.

Here's a sampling of recent events.

◆ Live from Miami...

I was less than 500 feet from Tiger Woods. There were, however, a few items between my location and his, such as a chain link fence, some landscaping, and a few thousand people. Security was tight for the Genuity Championship at Doral Country Club. No electronics other than a pager were allowed inside, so it was another mission for the mobile command post.

With a simple setup including an old Pro-2004 radio and window-mount UHF antenna, I found a wide variety of channels during the final round of play. Of all the public safety, event support, and news media channels found during this hour of monitoring, the best frequency turned out to be one of the wireless microphone channels we've discussed in this column previously. 773.125 MHz was the wireless mic at the final hole. This frequency captured the real action of the event, including the players and crowd reactions.

◆ Live from Coral Springs...

The week after Doral, the PGA Tour moved to the Honda Classic at Heron Bay Country Club. I decided to use the mobile command post here also, as security was similar and crowds were heavy. I monitored for a couple of hours here, starting just prior to the final round of the leaders.

Dozens of business-band channels were in

use for hospitality, concessions, vendors, transportation, parking and public safety. A large number of wireless microphones were in use, plus the normal population of news media channels.

As with Doral, the news media production trucks were corralled in a central area and primary communication antennas were hoisted on a large crane. A supplemental "COW" vehicle (Cell On Wheels), was located at the far end of the course with a variety of beam antennas pointed back toward the central media area.

As detailed on the PGA website, instant scoring and player statistics were the subject of some interesting communications. The PGA organization and their sponsors are heavily promoting wireless technologies, including local wireless networks (for staff) at Golf tournament venues and worldwide wireless scoring updates (for patrons) via the web and Wireless Application Protocol (WAP) cellular/PCS phones and organizers.

In fact, I was able to listen to the NBC TV broadcast audio on one radio, scan and search the local event and media channels on another radio, and receive updates about the tournament on my cellphone!

◆ Live from Daytona...

George W. Fetter avoids the crowds but still gets in on the action. "Monitoring the driver and [track] official frequencies (nine scanners in the shack helps!) during the race while watching on TV was super, probably better than being there in person. At least I could open my back door and hear the cars during the race as I live about 2 miles from the track.

George broadcast the Daytona 500 live over the Internet using Live365.com. He says, "next year I'll do another live broadcast, possibly with a second live365.com account, which would allow me to broadcast officials on one channel and drivers on another."

From Brian Cathcart, "Updated NASCAR team frequencies can be purchased right at the track for \$5 from a couple of different companies. That's what I always use, since they have verified the freqs during practice and qualifying.

"For Public Safety, I monitor the Daytona Beach EDACS system, which is actually part of Volusia County's system. It works like this: Volusia County has three cells in their EDACS system, System 1 through 3. System 1 and 2 are used for everything by Volusia County. Daytona Beach primarily uses talkgroups found on System 1, and some on System 2. But during races,

the traffic coordination and Speedway security all use talkgroups on System 3.

During the events, if they need to call in accidents or request more units, they will switch back to their regular talkgroups (on System 1). It's all seamless to the units, since the radios are programmed with the correct System to use; all the units have to do is switch to the proper channel on their radios.

"In any case, when going to the races in Daytona, monitor System 3 (EDACS system with LCN's) and monitor these talkgroups [listed below] for 99 percent of the Speedway activity. The talkgroups are active *only* on System 3, and the main talkgroups are active *only* on System 1."

"...if you want to monitor both the Speedway operations and the regular activities happening in the rest of the city, you have to scan both System 1 and System 3."

Rick Christian adds, "From last year's Pepsi 400, these were active."

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464.4375
464.7625

Roland R. "Mac" "McCormick III, monitoring from Savannah, Georgia, says, "I don't have anything specific to the race track or race teams, but I do have something for the aircraft that transport crews, teams, VIPs, etc. to and from Daytona. For the last few years, 123.475 has been active with informal traffic between pilots as they fly in and out of Daytona."

Finally, Gil Young advises, "I use this website, <http://motorsports/thepaddock.com/freqs.html>. I was at the Busch Series GNC Live Well 300 and they seemed to work dandy. What I wish they had were the frequencies for each driver's hood mounted camera. Then I'd be willing to get an IC-R3 and bring it to the track. Do you know of any sites that have the ATV freqs for the mounted cameras in the cars?"

Any IC-R3 owners out there with this information? If so, please send it to me and I'll include it in a future column. "Video Scanning" may become a whole new hobby, right?

As a footnote to professional sports monitoring, the use of the web and wireless text messaging to cellphones/organizers is gaining in popularity. Almost every major sport has experimented with this, and many are adopting such systems for full-time use. It's a great way to keep abreast of happenings inside a stadium or arena when you're monitoring from home or nearby locations.

Table 1: Golf Tournament Frequencies

Genuity Championship at Doral Country Club

450.0125	news media production/TV audio/IFB
450.1000	news media camera cues
450.1750	news media camera cues
450.4000	news media production
450.4875	news media production
450.8250	NBC TV audio
450.8750	NBC TV audio/IFB
450.9000	news media production/TV audio/IFB
451.5300	unid. (Scout hit)
461.6875	Doral Resort
461.9125	event support
466.9125	event support
467.9250	event support
773.1250	wireless mic
794.3800	wireless mic

152.9000	possible event use
462.0125	possible event use
462.9125	possible event use
464.3750	possible event use
467.7250	possible event use
467.7625	possible event use
469.4250	possible event use

Honda Classic at Heron Bay Country Club

154.5700	event support
154.6000	event support
154.8000	event support
450.0125	news media TV audio
450.1000	news media camera cues
450.1750	news media production
450.4000	news media, player scoring and statistics
450.4875	news media production
450.8250	news media camera cues
450.8750	NBC TV audio
450.9000	NBC TV audio
451.5500	Radisson Coral Springs Resort at Heron Bay
451.9750	event support
457.5750	event support (Scout hit)
462.6125	event support (traffic)
462.7125	event support
464.5000	event support (with 468.5000)
464.5875	event support (parking)
464.9375	event support
466.1000	event support (vendors)
466.1500	event support
467.6125	event support
467.9000	event support
467.9250	event support
468.9625	event support
469.5000	event support
469.5875	event support
769.8000	wireless mic
770.6250	wireless mic
771.7500	wireless mic
773.1250	wireless mic
782.6250	wireless mic
782.7125	wireless mic
783.7500	wireless mic
785.1250	wireless mic
795.7625	wireless mic
797.1250	wireless mic
798.6250	wireless mic

451.4875	possible event use
451.7625	possible event use
464.6000	possible event use
464.9375	possible event use
763.2250	possible wireless mic
781.8500	possible wireless mic
783.2500	possible wireless mic
787.6750	possible wireless mic
789.4125	possible wireless mic

Table 2: Daytona Racing Frequencies

compiled by George W. Fetter

(Status 0 = published, 1 = confirmed)

Channel / Freq / Car # / Driver / Status

1	451.3250	1	Steve Park	0
2	464.9250	1	Steve Park-Backup	1
3	452.6750	2	Rusty Wallace	0
4	451.8250	2	Rusty Wallace-Backup	1
5	453.6750	2	Rusty Wallace-Backup	0
6	461.7500	4	Kevin Lepage	1
7	464.3000	4	Kevin Lepage-Backup	0
8	464.3875	4	Kevin Lepage-Backup	0
9	468.2125	5	Terry Labonte	1
10	467.0375	5	Terry Labonte	0
11	460.9500	6	Mark Martin	0
12	466.7500	6	Mark Martin-Backup	1
13	468.5625	6	Mark Martin-Backup	0
14	457.3750	7	Mike Wallace	1
15	463.1750	7	Mike Wallace-Backup	0
16	467.0250	8	Dale Earnhardt Jr.	0
17	452.0500	8	Dale Earnhardt Jr-Backup	1
18	464.8750	8	Dale Earnhardt Jr-Backup	0
19	462.7875	9	Bill Elliott	0
20	461.4875	9	Bill Elliott-Backup	0
21	460.0875	9	Bill Elliott-Backup	0
22	457.2125	10	Johnny Benson	0
23	465.7125	10	Johnny Benson-Backup	0
24	461.7875	11	Brett Bodine	1
25	456.1625	11	Brett Bodine-Backup	0
26	465.9750	12	Jeremy Mayfield	0
27	469.6625	12	Jeremy Mayfield-Backup	0
28	462.5250	12	Jeremy Mayfield-Backup	0
29	460.4875	14	Ron Hornaday	1
30	462.7375	14	Ron Hornaday-Backup	0

31	464.9500	15	Michael Waltrip	1
32	453.7250	15	Michael Waltrip-Backup	0
33	451.9000	15	Michael Waltrip-Backup	1
34	463.9500	17	Matt Kenseth	0
35	463.7125	17	Matt Kenseth-Backup	0
36	451.3000	18	Bobby Labonte	1
37	451.3500	18	Bobby Labonte-Backup	0
38	467.1875	18	Bobby Labonte-Backup	0
39	452.9750	19	Casey Atwood	0
40	462.9750	19	Casey Atwood-Backup	0
41	451.4000	20	Tony Stewart	1
42	451.5000	20	Tony Stewart-Backup	1
43	451.3750	21	Elliott Sadler	0
44	452.2000	21	Elliott Sadler-Backup	0
45	468.9375	22	Ward Burton	1
46	462.8375	22	Ward Burton-Backup	0
47	467.0625	24	Jeff Gordon	1
48	469.4875	24	Jeff Gordon-Backup	0
49	465.8625	24	Jeff Gordon-Backup	0
50	466.7875	25	Jerry Nadeau	0
51	469.4625	25	Jerry Nadeau-Backup	1
52	469.8375	26	Jimmy Spencer	1
53	469.7625	26	Jimmy Spencer-Backup	0
54	466.3000	27	Mike Bliss	0
55	469.0000	27	Mike Bliss-Backup	0
56	466.9500	28	Ricky Rudd	1
57	466.4500	28	Ricky Rudd-Backup	0
58	469.0125	29	Kevin Harvick	1
59	462.0250	29	Kevin Harvick-Backup	0
60	463.2250	29	Kevin Harvick-Backup	0
61	464.0750	31	Robby Gordon	0
62	468.2500	31	Robby Gordon-Backup	0
63	468.6000	31	Robby Gordon-Backup	0
64	857.7875	32	Ricky Craven	0
65	860.8625	32	Ricky Craven-Backup	1
66	466.7375	33	Joe Nemecek	0
67	468.7750	33	Joe Nemecek-Backup	0
68	463.2875	36	Ken Schrader	1
69	461.2175	36	Ken Schrader-Backup	0
70	468.8000	40	Sterling Marlin	0
71	468.7000	40	Sterling Marlin-Backup	0
72	467.7750	43	John Andretti	1
73	464.3250	43	John Andretti-Backup	0
74	461.5500	44	Buckshot Jones	0
75	464.4000	44	Buckshot Jones-Backup	1
76	464.4000	45	Kyle Petty	0
77	462.0250	45	Kyle Petty-Backup	0
78	466.1750	45	Kyle Petty-Backup	1
79	461.8750	50	Rick Mast	0
80	461.7625	50	Rick Mast-Backup	0
81	467.8875	55	Bobby Hamilton	0
82	461.9875	55	Bobby Hamilton-Backup	0
83	467.5625	71	Dave Marcis	0
84	456.5625	71	Dave Marcis-Backup	1
85	463.8875	77	Robert Presley	1
86	468.8875	77	Robert Presley-Backup	0
87	466.2625	77	Robert Presley-Backup	0
88	468.5250	88	Dale Jarrett	1
89	466.4125	88	Dale Jarrett-Backup	0
90	466.3750	88	Dale Jarrett-Backup	0
91	467.1625	90	Hut Stricklin	0
92	461.5375	90	Hut Stricklin-Backup	0
93	463.9750	92	Stacy Compton	1
94	464.1750	92	Stacy Compton-Backup	0
95	460.1625	93	Dave Blaney	1
96	468.9375	93	Dave Blaney-Backup	0
97	466.2750	99	Jeff Burton	1
98	466.8625	99	Jeff Burton-Backup	1
99	460.9750	01	Jason Leffler	0
100	464.8000	02	Ryan Newman	1
121	462.1000	40	Sterling Marlin-Backup	0

Brian Cothart's EDACS trunking list for Daytona:

1 = 856.7125
2 = 857.2125
3 = 858.2125
4 = 859.2125
5 = 860.2125
14-005 = Speedway Security/Operations
14-010 = EVT TRAFFIC (Event Traffic), traffic control for Race
14-011 = Car-to-Car of 14-011

Links of interest from this column:

PGA Golf Tournaments:

<http://www.pgatour.com/tournaments>

George W. Fetter's scanning website:

<http://www.milaircomms.com>

Lindsay Blanton's trunking website:

<http://www.trunkedradio.net>

The Paddock website:

<http://motorsports/thepaddock.com/freqs.html>

Bienvenue à Montréal

Bonjour et bienvenue à Montréal. Hello and welcome to Montreal, Canada's second largest city and the urban center of French speaking Canada.

The City of Montreal lies on an island in the St Lawrence River in the Province of Quebec. Montreal is a busy port with direct access to the Atlantic Ocean through the St Lawrence Seaway. Montreal is also the business capital of Quebec and the headquarters location for many Francophone corporations. Montreal was once the center of commerce for all of Canada, but many businesses have moved further west to Toronto as a result of the ongoing political debate over language differences. Politics aside, Montreal is a beautiful city and a great place for monitoring enthusiasts to spend a few days exploring the airwaves.

In Montreal, *on parle le Français*, but if you are not a French speaker you will get by in this city on English alone. The only official language throughout the Province of Quebec is French, but Montreal is a cosmopolitan city inhabited by the citizens of the world. However, the majority of native Montrealers speak to each other in French, and that is the language that you will hear predominantly on the airwaves.

Scanning Canada's executive jet touches down this month at Montreal's Dorval airport. Montreal's other major airport, Mirabel, was built to handle international traffic, but has fallen into disuse for most passenger traffic. As a result, Dorval now handles scheduled domestic and international flights into and out of the city. Dorval has been extensively remodeled and rebuilt, but the end result is still a cramped, overcrowded facility that is not particularly easy to get through. When you leave Montreal, you will have to pay a ten dollar "airport improvement fee." *Merci beaucoup et au revoir!*

♦ Monitoring Dorval Airport

Table 1: Airport Communications

Radio: 126.7 (altitude up to 12,500 feet), 123.55 (altitude over 12,500 feet)
Automatic Terminal Information Service (ATIS): 128.0 (English), 127.5 (French)
Clearance Delivery: 125.6
Apron: 122.075

Ground: 121.9, 275.8
Tower: 119.9, 267.1
Arrivals: 118.9, 124.65, 126.9, 287.2
Departures: 118.9, 124.65, 268.3
VFR (Visual Flight Rules) Advisory: 134.15
Selective Calling: 126.9
Montreal Centre: 132.35, 133.225, 134.4, 229.2, 245.0, 294.0

Table 2: Navigation Beacons

VOT (VHF Omnidirectional range Test facility): 115.7
VOR/DME (VHF Omnidirectional Range/Distance Measuring Equipment):
ID code=YUL 116.3 located at 45 36 56N, 73 58 16W
DME:
ID code=IUL 109.3 located at 45 27 51N, 73 45 48W
ID code=ICA 108.5 located at 45 27 33N, 73 45 48W
ILS:
ID code=IDO 109.9 (runway 10-28)
ID code=IZZ 111.9 (runway 24R)
ID code=IMQ 110.5 (runway 24L)
ID code=IUL 109.3 (runway 06L)
ID code=IOA 110.5 (runway 06R)
Glide Path beacons:
329.6000 (Runway 06), 331.1000 (Runway 24), 332.0000, 333.8000 (Runway 10)

Scanning Canada's flying tour of the Great White North has already traveled through four time zones. There are still two more time zones to go before we reach the eastern shore. In June, we will visit Quebec



Dorval Airport – Montreal's International Gateway

City and then on to Halifax and St John's (the easternmost city in North America). By the fall we will be sweeping across the Arctic on the northern air route through Iqualuit (capital of the new territory of Nunavut), Nanisivik, Resolute, and Yellowknife, with a final stop in the Yukon at Whitehorse. Our tour will have taken readers through Canada from coast to coast to coast (that is from the Pacific Ocean, to the Atlantic Ocean, to the Arctic Ocean).

Scanning Canada will then leave the airways and explore Canada, by road, rail and water. Readers are invited to suggest roadside, railside and dockside stops for the column. Send your suggestions to *ScanCan* at johndavidcorby@yahoo.com.

Table 3: Dorval area aviation (FM)

Aéroport de Dorval, QC Aéroports de Montreal:
414.2625, 414.2625
Air Canada:
451.9250, 456.9375, 460.4250, 460.7000, 461.6250, 462.0500, 462.5250, 463.2500, 465.7125, 467.0625, 467.4375, 469.8500
Servisair Dorval Ltee Dorval, QC (Aéroport): 468.2625
Services Aéroportuaires Aéroport Dorval, QC: 463.8250
Bradley Air Services Ltd, Dorval Airport: 461.900

Table 4: Other related frequencies

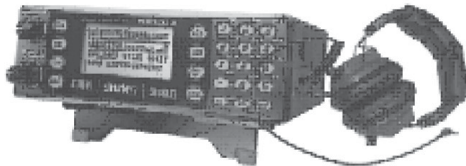
Kahnawake Sport Complex Mohawk Council of Kahnawake Fire:
159.1200, 412.3125, 412.9625, 412.9625
Office National Du Film du Canada 451.1500, 456.1625
Institut National Recherche Scientifique 451.2250, 456.2375

A few years ago Montreal achieved a certain notoriety as the result of a freak weather event that will forever linger in the memory of Montrealers. It was called simply the "Ice Storm." A sustained period of heavy freezing rain brought down power lines and collapsed many of the main hydro-electric line towers. A large part of the city and surrounding area was deprived of electric power for up to a month. The local heroes of the day were the men from the utility company "Hydro-Quebec" who laboriously restored electricity to the shivering citoyens de la Ville de Montreal. When you step out of Dorval airport tune into 458.5125 MHz for the local hydro crews.

Au revoir until next month when we visit historic Quebec City. 73 de John, VA3KOT.

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Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$169.95
Bearcat Sportcat 180B handheld sports scanner.....	\$149.95
Bearcat 80XLT 150 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BC77 information mobile scanner.....	\$139.95
AOR AR8200 Mark II Wide Band handheld scanner.....	\$539.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$209.95
ICOM PCR1000 computer communications receiver.....	\$379.95
ICOM R10 handheld wideband communications receiver.....	\$279.95
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HFDL Breaks the Sound Barrier

Around 1998, Aeronautical Radio, Incorporated, (ARINC) began to deploy GLOBALink, its worldwide aircraft communications mode. This system promised a seamless integration of satellites, existing data links on very high frequency (VHF), and a new system called HFDL (High-Frequency Data Link) being tested on shortwave radio (high frequency, or HF).

Today GLOBALink is operational and in use by a growing number of airlines. HFDL's distinctive bursts appear in several aeronautical radio bands. It's a great system. However, until recently it was also an uncopyable system for utility radio fans, unless they laid out some serious money for high-end decoding packages.

Enter Charles Brain (amateur callsign G4GUO), the "brainy" British ham who had already revolutionized digital monitoring for a lot of people through his ultra-sophisticated Automatic Link Establishment (ALE) controller. He offered PC-ALE as free software for the Windows personal computer and sound card—a rather amazing accomplishment.

In late February, Charles did it again, with a simple HFDL decoder. This, too, uses Windows and the computer's existing sound card. Early versions were resource hogs, but the latest code runs well on a slow laptop. It just sits there and works. When a burst is heard, a message appears on the screen. If an airplane identifier is found, it writes to a little list.

Since Charles' web site (<http://www.chbrain.dircn.co.uk>) tends to exceed its bandwidth limits rather frequently, it's a good idea to grab this free file somewhere else. Until things die down, the latest version will always be on the Utility World site, at the address in the masthead.

◆ Receiving HFDL

As we've seen, HFDL is highly proprietary to ARINC, a giant corporation which started life as an airline radio consortium. It currently operates 13 ground stations worldwide. Note the high latitude of several of these, to favor polar air routes with poor to no satellite coverage.

HFDL will be a snap for anyone familiar with ARINC's busy ACARS (Aircraft Communications, Addressing, and Reporting System). This relatively similar VHF network, which has been around for a long time, sends data in "packets" that are easily decoded by hobbyist equipment and software.

ACARS and HFDL packets come in three types. These are uplinks (ground-to-air), downlinks (air-to-ground), and squitters. "Squitter" is aviation jargon for an identification and information burst. Each HFDL ground station broadcasts one of these every 32 seconds.

HFDL squitters contain considerable information on the current link configuration and frequency setup, both of which optimize in real time. Ground stations usually choose three frequencies depending on conditions. Receiving stations do a quick software computation called a CRC (Cyclic Redundancy Check), which helps aircraft find error-free channels. Of course, this regular squittering also helps DXers find new frequencies. Once you've heard their distinctive buzz, you'll be turning them up all over.

The buzzy modulation uses a single-tone radio modem with phase-shift keying (PSK). It's tuned in upper sideband (USB), with a tone center of 1440 hertz (Hz). All transmissions are fixed at 1800 baud, but the number of PSK states can fall back from 8 to 2 as reception degrades, slowing the throughput accordingly. Therefore, effective speeds to the user are 300, 600, 1200, and 1800 bits per second, depending on circuit conditions.

Aircraft transmissions are simplex. In my experience, they usually seem to be a bit off-frequency, something PC-HFDL will be happy to let you know. A plane connecting through a ground station is assigned a "slot" and followed. HFDL aircraft identifiers are usually a company code plus a flight number. As with ACARS, longer messages contain the plane's registration number. Around here, the most commonly heard airlines are Lufthansa and United Parcel Service.

Uplink messages to airplanes often contain weather data in Routine Aviation Meteorological (METAR) code. Downlinks may contain technical information, but most are navigation updates of the aircraft's position, in degrees, minutes, and seconds of latitude and longitude. These are frequent, and you can watch the coordinates change. If this sounds like a really great way to track planes as they fly around the world, well, welcome to HFDL!

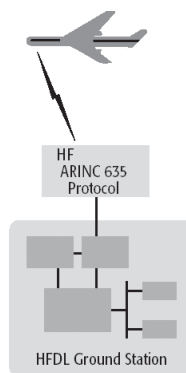


Table 1: HFDL Frequencies

Station (ID number)	Frequencies (kHz)
San Francisco, CA (001)	2947.0 4672.0 5508.0 6559.0 8927.0 11327.0 13276.0 17919.0 21934.0
Molokai, HI (002)	2878.0 3019.0 3434.0 5463.0 5508.0 5529.0 5538.0 8936.0 10081.0 11348.0 17934.0 21928.0
Reykjavik, Iceland (003)	3116.0 3900.0 5720.0 6712.0 8977.0 11184.0 15025.0 17985.0
Riverhead, NY (004)	3428.0 5523.0 6652.0 8912.0 11315.0 13276.0 17919.0 17934.0 21928.0 21931.0
Auckland, New Zealand (005)	3016.0 3404.0 5583.0 6535.0 8921.0 10084.0 11327.0 13351.0 17916.0 21949.0
Hat Yai, Thailand (006)	4687.0 5655.0 6535.0 8930.0 10066.0 13309.0 13270.0 13351.0 17928.0 21949.0
Shannon, Ireland (007)	2998.0 3455.0 5547.0 6532.0 8843.0 8942.0 11384.0
Johannesburg, South Africa (008)	3016.0 4681.0 8834.0 13321.0 21949.0
Barrow, Alaska (009)	6646.0 8936.0 10093.0 11354.0
Annapolis, MD (010)	This station is closed down
Anchorage, Alaska (012)	This station is closed down
Santa Cruz, Bolivia (013)	8957.0 13315.0 21967.0 21997.0
Krasnoyarsk, Russia (014)	10087.0 13321.0 21949.0
Al Muharraq, Bahrain (015)	8885.0 10075.0 11312.0 17967.0 21982.0
Agana, Guam (016)	11306.0 13339.0 17919.0
Planned locations: Grand Canaria, Canary Islands.	

◆ Lourdes is Finally Closed

Lourdes, the famous Russian listening station in Cuba, is finally closed. January saw the beginning of serious dismantling at this notorious "spy base," which at one time employed hundreds of people busily eavesdropping on US communications from just outside Havana. By now, most equipment should have been crated and shipped back to Russia.

"Numbers" listeners have detected no large changes in Cuban spy transmissions. Nobody really expected broadcast locations to change, since the Lourdes base was a listening station. Schedules haven't change, either, except perhaps with the "English Lady"—a relayed Russian transmission given the code "E17" by ENIGMA (the European Numbers Intelligence Gathering and Monitoring Association). Some people think E17 is being heard a bit less lately, though it's too soon to really know if this is a permanent change.

The other transmissions are all made by Cuban intelligence, or so we think. These are the "Atencion!" Spanish female (V2), the "cut" Morse code transmission (M8), and a weird, singing, Spanish thing called the "Babbler" (V21). These three seem to be coming as hot and heavy as ever. Keep looking for any new schedules on them.

UTILITY LOGGINGS

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARINC	Aeronautical Radio, Inc.
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning and Control System
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DX	Distant Transmitter
E3	British Lincolnshire Poacher, Cyprus
E10a	Israeli phonetic numbers, null message
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FM	Frequency Modulation
GHFS	Global High-Frequency System
HFDL	High-Frequency Data Link
JSTARS	Joint Surveillance Target Attack Radar System
M8	Cuban "Cut Number" CW (sounds like letters)
M22	4XZ, Israeli Intelligence CW "numbers"
MARS	Military Affiliate Radio Service
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MFSK	Multiple Frequency-Shift Keying
NATO	North Atlantic Treaty Organization
NORAD	North American Aerospace Defense Command
Pactor	Packet Teleprinting over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SHARES	Shared Resources
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
UK	United Kingdom
Unid	Unidentified
US	United States
USACE	US Army Corps of Engineers

1794.0	Stettin Radio, Poland, with navigational warnings in English and Polish at 2157. (Patrice Privat-France)
2618.5	GYA-UK Royal Navy, on a new FAX frequency, simulcasting on 4610, 8040, and 11086.5, at 1212. (Day Watson-UK)
2680.0	4XZ-Israel Navy, Haifa (M22), with CW marker at 2345. (Ary Boender-Netherlands)
3137.0	Refueler 75-US Air National Guard tanker, in patch to Maniac Ops (probably Bangor, ME), at 0718. (Tom Severt-KS)
3179.0	FD18-French Air Force, Nice, with recorded French voice marker at 2058. (Boender-Netherlands)
3340.0	"L"-Russian CW single-letter marker, St. Petersburg, at 0026. (Boender-Netherlands)
3829.7	Unid-German Coast Guard, weather in German from Hamburg, in ARQ at 2113. (Boender-Netherlands)
4043.0	"P"-Russian CW single-letter marker, Kaliningrad, at 2300, switched to uncopiable RTTY at 2305, then back to "P" at 2310, and gone at 2315. (Boender-Netherlands)
4292.0	IAR-Roma Radio, Italy, with CW weather at 2019. (Boender-Netherlands)
4325.0	"R"-Russian CW single-letter marker, Izhevsk, at 2048. (Boender-Netherlands)
4369.0	CIO2-Israeli phonetic "numbers (E10a), in AM, callup only, at 2048. (Boender-Netherlands)
4620.0	Bravo Foxtrot-US Navy tracking net, working various single-letter calls at 0436. (Severt-KS)
4721.0	Goliath Charlie-Unknown US military, working Dragnet Xray, probable AWACS, then secure voice at 1325. (Severt-KS)
4958.0	Unid-CW "numbers" (M10), callup "780 24 181," at 1720. (Boender-Netherlands)
5063.0	Unid-CW "numbers" (M10), in progress, ended "276 35 000," at 1720. (Boender-Netherlands)
5327.5	NWO-USACE, Omaha, NE, working NWOOA in ALE at 1844. (Severt-KS)
5434.0	"The Whales"-unknown hooty noises, probably unintentional US military, new frequency, at 0906. (Severt-KS)

5696.0	Striker 24-Unknown helicopter, calling "GANTSEC" (US Coast Guard Greater Antilles Section, PR), finally answered by CAMSLANT (US Coast Guard, VA), at 0211. (Ron Perron-MD)
6529.0	Unid-Cuban "Babbler" (V21), singing "numbers," faded at 2345. New "singer" on slightly different frequency, at 2350. (Barry Williams-AL)
6694.0	Halifax Military-Canadian Forces, patching Gonzo 6 to Greenwood, at 0220. (Perron-MD)
6697.0	Test Hop-US military, with EAM at 0037. (Jeff Haverlah-TX)
6912.0	CIO2-Israeli phonetic "numbers (E10a), in AM, callup only at 0050. KPA2 (E10a), AM callup only, at 2318. (Williams-AL)
6940.5	Shadow Warrior-US military exercise, working Blue Air Cell at 1917. (Severt-KS)
6941.0	"Shadow Warrior," working "Destroyer 10," at 0325. (Williams-AL)
6986.0	ART2-Israeli phonetic "numbers (E10a)," in AM, callup only, at 0403. (Williams-AL)
7657.0	Panther-US Drug Enforcement Agency, Bahamas, setting radio watch with Coast Guard 13C, at 0318. (Perron-MD)
7845.0	Bangkok Aero, with RTTY messages and then testing, at 1820. Unid-Spanish language voice, then switched to RTTY testing on 7847 (assigned channel center), at 1830. (Watson-UK)
8056.0	369-US military aircraft in exercise, working Ghost Rider Base at 0312. (Severt-KS)
8122.0	Canberra Control-Royal Australian Navy, working vessel Wewak, at 1249. (Perron-MD)
8156.0	Unknown female with Caribbean accented English, working ship 2C2, in possible Bahamian patrol net, at 0335. (Perron-MD)
8188.0	9MR-Malaysian Navy, with RTTY messages in English and a Malaysian language, at 1923. (Watson-UK)
8337.5	CAMSLANT-US Coast Guard, VA, working Coast Guard 1716 at 2200. (Mid-Atlantic DXer-MD)
8700.0	Unid-US military psychological operations, music and Central Asian languages, probably a feeder for Commando Solo broadcast aircraft over Afghanistan, at 1518. (Boender-Netherlands)
8776.0	Bravo Whiskey-US military tracking net, with various single-letter calls, at 0253. (Severt-KS)
8867.0	Brisbane-Air route control, calling Korean Air 824, at 1325. (Perron-MD)
8885.0	AY1954-HFDL identifier of aircraft passing position to ARINC station #15, Al Muharraq, Bahrain, at 2355. (Privat-France)
8942.0	SU0318- Aeroflot 318, with HFDL for Shannon, at 0740. (Privat-France)
8982.0	ICM-US Navy, working "6-C-E," other side not heard, at 0751. "P-4-I" working S4JG Ops, at 0811. (Severt-KS)
8983.0	CAMSLANT-US Coast Guard, working Rescue 6024, at 0648. (Severt-KS)
8992.0	Baja 400-US military, came from 11175, no joy on "Mainsail" general call, at 0144. (Haverlah-TX)
9007.0	Trenton Military-Canadian Forces, patching Canforce 2654 to Wing Ops, at 2305. (Perron-MD)
9023.0	Northern Lights-NORAD northeast US control, NY, working Magic 75, a NATO AWACS, at 2140. (Perron-MD)
9025.0	Bandsaw Yankee-"Back end" battlestaff call of a US military AWACS, in a patch to Tinker AFB via Offutt, at 1811. Sentry 18-Front end (flight crew) of same aircraft, patching Tinker AFB for weather, at 2215. (Severt-KS) Navy 858-US Navy, attempting a patch to US Coast Guard via Offutt, went to 8992 kHz, at 2149. (Brent Davenport-CO)
9031.0	Architect-UK Royal Air Force, working Ascot 3428 at 1243. (Boender-Netherlands)
9120.0	Andrews-US Air Force Mystic Star control station, working aircraft "30" on "Foxtrot-005," at 1445. (Larry Van Horn-NC)
9122.5	WUE6-USACE, Nashville, TN, calling RRV3, USACE Ready Response Vehicle (comm truck), ALE and voice, at 1715. (Van Horn-NC) WUG-USACE net control, working several RRVs and emergency units at 1800. WUJ13-USACE, voice radio check with WUJ1 (Omaha, NE) on "Channel 8," at 1929. (Severt-KS) [Possible Olympic activity. -Hugh]
9145.0	363-US military aircraft in big exercise, working Ghost Rider Base and 361 at 2255. (Severt-KS)
9323.0	Unid-5 letter code groups in CW, at 1030. (Geoff Halligey-UK)
9333.0	Cuban cut number CW (M8), shifted frequency from 9323, at 1010. (Halligey-UK)

- 9350.0 Weird beacon in non-international Morse CW, continuous, at 1110. (Halligey-UK)
- 10204.0 Lonesome-US military, with EAM simulcast on 8992 and 11244, at 1508. (Haverlah-TX)
- 10248.0 8BY-French Intelligence (M16), with 3-number CW groups at 0645. (Sevart-KS)
- 10780.0 Fisher-US Air Force Cape Radio, Cape Canaveral, FL, working Norwegian Navy missile torpedo boat *Skjold*, at 1645. (Allan Stern-FL). Cape Radio, working Strikestar (US military E-8C JSTARS), at 2202. (Perron-MD)
- 11175.0 Property-US Strategic Command, patch via Offutt to Arctic Fox for exercise traffic, at 1644. (Haverlah-TX) Reach 8222-US Air Force Air Mobility Command, trying to patch via Offutt but didn't initiate, at 2129. (Davenport-CO)
- 11205.0 Smasher-US Air Force, Key West, FL, working Dagger 88, mention of "Barrel Master," at 0234. (Perron-MD)
- 11217.0 KGD34A-US government STAR (SHARES Transportable Auxiliary Radio), working KNR43 (unknown SHARES control station), at 2211. (Sevart-KS)
- 11220.0 Trout 99-US Air Force, in patch to Banner Ops (Royal Air Force, Mildenhall, UK) via Andrews at 0440. (Perron-MD)
- 11226.0 Dragnet Whiskey-US military, working an unknown station at 2132. (Sevart-KS)
- 11232.0 Trenton Military-Canadian Forces, working NATO 17, an AWACS, at 0043. Trenton, with Olympic hockey scores for Canforce 342, at 0045. (Perron-MD) Razor 33-US military JSTARS, patch to Raymond 19 (Robins AFB, GA) via Trenton Military, at 2246. (Sevart-KS)
- 11244.0 Religious-US military, with traffic for Log Road, at 1857. (Haverlah-TX)
- 11266.6 Unid-2 or 3 stations with repeated Islamic prayers in Arabic, at 0739. (Haverlah-TX)
- 11271.0 Trenton Military-Canadian Forces, calling Canforce 305, no joy, at 2302. (Perron-MD)
- 11345.0 Reach DQ1-US Air Force, working Stockholm Radio, Sweden, at 1147. (Boender-Netherlands)
- 11384.0 LH8264-Lufthansa 8264, positions for Shannon in HF DL, at 1630. (Privat-France)
- 11466.0 ALG-Sonatrach Oil, Algiers, calling HMD in ALE, at 1906. (Watson-UK)
- 11492.0 6141-Unknown military, possibly Iran, with ALE sounding at 1949. (Watson-UK)
- 11495.0 1210-Unknown station sounding in ALE at 1918. 1220, sounding at 1941. (Watson-UK)
- 11545.0 Lincolnshire Poacher, Cyprus, with British Intelligence "numbers" (E3), at 1500 (Boender-Netherlands)
- 12070.0 Downtown-US military, with EAM simulcast on 8992 and 11244, at 1439. (Haverlah-TX)
- 12122.0 WUJ13-USACE, radio check with WUJ1 (Omaha, NE), at 1927. (Sevart-KS)
- 12525.5 UFHR-Russian vessel *Druzhba Narodov*, with SITOR-A traffic for USU, at 1000. (Privat-France)
- 12587.0 LZW-Varna Radio, Bulgaria, with SITOR-B news in Bulgarian, at 1545. (Privat-France)
- 12745.5 JJC-Tokyo Radio, Japan, with a Japanese newspaper in slow FAX (60/576), at 1543. (Hall-RSA)
- 12808.5 VTG7-Indian Navy, Mumbai, with CW weather, bad signal with many spurious emissions, at 2001. (Watson-UK)
- 13155.0 Mush Melon-US military, with EAM at 2010. (Haverlah-TX)
- 13200.0 New Crop-US military, working Lajes, went to 15016, at 0620 (Haverlah-TX)
- 13215.0 Goliath Charlie-US military, working Dragnet Xray (AWACS), clear and secure, at 1327. (Sevart-KS)
- 13257.0 Trenton Military-Canadian Forces, in exercise with Gonzo 06A and 06C. (Perron-MD)
- 13315.0 "013"-ARINC HF DL station, Santa Cruz, Bolivia, with "squitter" identifiers at 2300. (Privat-France)
- 13321.0 "014"-ARINC HF DL station. Krasnoyarsk, Russia, squitters at 1700. (Privat-France)
- 13333.0 Unid-Aircraft giving position report, in Spanish, to what was probably Cubana Airlines operational control, at 0004. (Perron-MD)
- 13846.7 RFFAB-French Ministry of Defense, Paris, with the usual huge ARQ list of vessels, at 1610. (Hall-RSA)
- 13855.0 OXT-Copenhagen Meteo, Denmark, with a FAX ice chart at 1311. (Watson-UK)
- 13875.7 Unid-Egyptian Embassy, Belgrade, Yugoslavia, with SITOR-A message and Arabic chatter, at 1531. (Watson-UK)
- 13907.0 CS1-US Customs Service, sounding in ALE, along with J03, PR1, TST, FL1, and CS2, then finally scrambled voices at 2341. (Sevart-KS)
- 13927.0 AFA2XZ-US Air Force MARS, FL, patch from Bison 81 regarding landing gear problems, at 1901. (Perron-MD)
- 14396.5 NNN0TUDU-US Navy/Marine Corps MARS, net control checking many MARS and SHARES stations into the "Salt Lake City Olympics Support Network," at 1700. (MADX-MD)
- 14700.0 STAT154-Tunisian Ministry of Information, calling STAT5 in ALE, at 0945. (Privat-France)
- 15016.0 New Crop-US military, came from 13200 to call Lajes, no joy at 0622. (Haverlah-TX)
- 15043.0 Bandsaw Yankee-US military, in phone patch through an unknown station, at 1850. (Sevart-KS)
- 15614.9 AXI-Darwin Meteo, Australia, weather FAX at 1445. (Hall-RSA)
- 15980.0 EZI2-Israeli phonetic "numbers (E10a), in AM, callup only, at 1504. (Sevart-KS)
- 16035.0 9VF252-Kyodo News, Singapore, with a Japanese newspaper in slow FAX (60/576), at 1535. (Hall-RSA)
- 16412.7 Unid-Kinshasa banking information, in French, slow PACTOR (100/200) at 0800. (Hall-RSA)
- 16706.5 ZCRP-UK vessel *Millenium Falcon*, with traffic for UCE, Arkhangelsk Radio, Russia, at 1400. (Privat-France)
- 16801.0 Unid-Ship station with SITOR-B Philippines News Agency relay in Tagalog, at 1909. (Watson-UK)
- 16803.0 "Whisky utang I"-Partial name of a ship station with SITOR-B Philippines News Agency relay in Tagalog and English, ended at 1616. (Watson-UK)
- 17328.0 CV0790-HFDL identifier for flight over Bangladesh, working station #06, Hat Yai, Thailand, at 1816. (Privat-France)
- 17940.0 Iberia flight (number missed), airliner working Control in Spanish, at 2150. (Perron-MD)
- 17940.0 Unid-Aircraft giving position report, in Spanish, to what was probably Iberia airlines control, at 2235. (Perron-MD)
- 17967.0 "015"-ARINC HF DL, Bahrain, working aircraft with registration HZ-ANB, at 1745. (Privat-France)
- 18003.0 Sentry 12-US Air Force AWACS, in patch to Raymond 24 (Tinker AFB, OK) via Offutt, at 2029. (Sevart-KS)
- 18183.4 7RQ20-Algerian MFA, Algiers, with Flash priority traffic for several embassies, in Coquelet teleprinting mode, at 0740. (Hall-RSA)
- 18893.0 UCTS-Russian vessel *Pavel Koutakhov*, passing weather observations to Murmansk in 3rd-shift Cyrillic RTTY, at 1611. (Watson-UK)
- 19242.0 Unid-Unknown European PACTOR e-mail net, with a long political treatise in French, possibly from the "Circle Against Sex Trafficking," at 1630. Unid-PACTOR business messages in English and German, at 1632. (Hall-RSA)
- 19636.0 P6Z-French MFA, Paris, calling Z4D in FEC, at 1500. (Hall-RSA)
- 21866.0 WGY906-US Federal Emergency Management Agency Region 6, TX, working WGY 965, Indiana state emergency center, in ALE-initiated voice contact at 1718. (Van Horn-NC)
- 21931.0 LH8273-Aircraft giving position in HF DL, at 1706. N453UP-Probably United Parcel Service, HF DL traffic at 1727. "04"-ARINC, New York, working aircraft ID122, HF DL at 1719. (Watson-UK)
- 22408.5 UFL-Vladivostok Radio, Russia, working ship UDUK in 3rd-shift Cyrillic SITOR-A, at 0822. (Watson-UK)
- 22583.0 FUX-French Navy, Le Port, working a French ship in RTTY, then back to the usual marker, at 1458. (Watson-UK)
- 22603.5 UIW-Kaliningrad Radio, working ship RTMS in slow, 3rd-shift RTTY, at 1535. (Watson-UK)
- 22857.7 RFFINDI-French naval vessel *Alindien*, with ARQ weather for AIG1934, at 1025. (Hall-RSA)
- 25216.3 ZSD-South African Navy, Durban, with MFSK at 1552. (Hall-RSA)
- 26859.0 Favorable-US military, with EAM simulcast on 8992 and 11244, at 2027. (Haverlah-TX)
- 27550.0 83KNY-US National Communications System, working 43KNR in ALE at 1945. (Sevart-KS)
- 29005.0 Unid-Russian FM skip, possibly a taxi dispatcher, at 1600. (Boender-Netherlands)

Digital Ops from South America

This month we take a look at some unusual South American naval operations and update you on the extensive Romanian Ministry of the Interior (MOI) Automatic Link Establishment (ALE) network.

◆ Ecuador's Maritime Command

A few months ago, we came across an unusual SITOR-B (FEC) signal just inside the 12 MHz maritime band on 12323.5 kHz – unusual because of a speed and tone shift combination that meant it was unlikely to be decoded by standard SITOR-B equipment with 100bd and 170Hz shift. Fortunately, Hoka's decoders (and many others) provide user-selectable customization of tone shift and speed. After measuring the signal accurately, we used the "B" key from within the SITOR-B module to manually set the speed to 109.5bd and the "S" key to set the tone shift to 400Hz.

With the correct settings in operation, we saw some interestingly formatted messages that pointed to a South American user. Here's the first plain-text message we saw: (Slash indicates carriage return.)

```
zczc / allpp / qkqkq
msg. nr. 001
p 190245z ene-02
dd zon
info esmaar coopna digmat coopin capbaq
grnc / bt
zipe de pto. baquerizo habitad.
bt / sendwdq
```

The giveaway to the message's Ecuadorian origins was the mention of Puerto Baquerizo, one of that country's main ports. Next, we searched the web for further clues to the abbreviated recipients – "esmaar, coopna, digmat" – and so on.

The results of one search led us to the website of Ecuador's Port Authority (see Resources), which appears to be under the direction of that country's maritime and naval commands. Scanning those web pages revealed the addresses to be various parts of this organization. For example, ESMAAR is the headquarters of the Maritime School, whereas CAPBAQ is the Captain at the port of Puerto Baquerizo. Other addressees include various sections of the Coast Guard, Fisheries Protection Service, Inland Waterways Police, Meteorological Office and other MOI functions.

As we mentioned earlier, encrypted messages are also sent on this network, again carrying the distinctive "zczc allpp qkqkq" lead-in sequence. Here is an example:

```
zczc / allpp / qkqkq
hkojf apmmz xjux enajh tatlh fsay shqyq xnmzm wgxow ewwof
nyxtw ufgrz lvkoh xhtdl jegiy pkhsb mboxl pkkzi icvpy jizyh aapcd yhcnc
nobhk nuwit vaghq wabvx kddcd dtlug bvjaq cgszh iciwo pekam okaga
obvou bzopz fldan rlgq epawv omfhf szdpk boeav yqeyu cozzy awgoo
rmxmc sauxi qolwp oydy ehvge lmezt jiayp ykhlpl cxljk qazmi figid seowd
scwbk itsog uloxr solui
```

ujhov / nnnn

This interesting network can be heard at most times of the day and night during from the US. Doubtless it reaches further away, too.

◆ Brazilian Navy

The RTTY transmissions from the Brazilian Navy's facilities in Brasilia, Belem, and Rio de Janeiro have been well documented in various places. Less well known is the 100bd/170Hz SITOR-B traffic we monitored recently on 19021 kHz from the same source. The plain text messages are somewhat similar in style to those from Ecuador, again using mnemonic addressees:

```
ermbra nr 03
preferencial
p-261703z/set/01
de ermbra
para esnvrg
grnc / bt
dgmm 0550 capitula 07 exercicio bipt quando se ama, nao eh
preciso entender o que acontece lah fora, porque tudo passa a acontecer
dentro de nos. deus sempre dah uma segunda chance na vida. quem
conhece a felicidade nao consegue mais ceitar humildemente a tristeza
bt / nnnn
```

Much of this plain text material tends to be training purposes (bible excerpts, etc).

The encrypted traffic is quite unique from any other station we've come across. Here's a sample of the mixed character off-line encryption scheme employed by the Brazilians:

```
ea3252dfc5eab5c64eeeo0ctued5#ea1d2dd2f1d57c76aa5b2e464
12f2c7e810b79f9a95744b2e6a475f3b4-1d4796f03
0f8c998b1%5secbf1eccecd6d651e498fvtb
nnnn
```

As an example of how persistence pays off, we monitored this network for a number of weeks without any sufficient indications that this was indeed the Navy. However, a short piece of (rare) chatter between two operators finally gave the game away one Sunday morning:

```
int zev zev kkkkkkkk
gru grx che precisar ste favor ligar
okokokok
wx de wb
afi ok / grx
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Note the fourth line, where we're confident that "WX" represents PWX33 (Brasilia) and "WB" is PWB32 (Belem). The mnemonic "ERMBRA" is most likely "Estacao Radio da Marinha Brasilia."

Further monitoring of this network revealed some additional frequencies: 16232.1 and 17422.1 kHz, again using SITOR-B, as well as 12169.65 kHz using PacTOR.

◆ Romanian ALE Net Update

In the MT November 2001 issue, we profiled a Romanian joint civil defense, internal se-

curity and police network undergoing rapid expansion during the early part of 2002. The network has since grown both in terms of locations and frequencies and appears to have settled to a steady state.

At the time of preparing our first profile of this network, we were unsure of the meaning of the various suffixes (C1, B11, etc) applied to the basic ALE identifiers. We're still no closer to answering this question, but it is apparent that each suffix only appears on certain frequencies. Perhaps the suffixes represent different operational units within the network?

Here's the full run-down of this busy MOI network:

Freq (kHz)	Suffixes	Freq (kHz)	Suffixes
3390		8005	B2
4110	B2, B4	8010	B1, B4, B5, B11
5078	P2	8015	B3
5115		8020	B4
5210	C1	8035	B7
6550	B12	8050	B10
6770	B1, B4	8190	B11
6800	B5, R7	9052	C2
6915	C3	10370	
6920	B4, B7	10375	B11
6945	B2, B4	10380	B4
7476	R9	10635	B6
7510	C2	10640	B1
7655	C4	10645	B5
7968	B5, R7	10730	B8

ALE ID	Location	ALE ID	Location
ALB	Alba Iulia	GIU	Giurgiu
ALX	Alexandria	IAS	Iasi
ARA	Arad	MIR	Miercurea Ciuc
BAC	Bacau	ORA	Oradea
BIS	Bistrita	PIT	Pitesti
BMA	Baia Mare	PLS	Ploiesti
BOT	Botosani	PNM	Piatra Neamt
BRL	Braila	RAM	Ramnicu Valcea
BSV	Brasov	RES	Resita
BU1	Bucharest	SGH	Sfintu Gheorghe
BUZ	Buzau	SIB	Sibiu
CAL	Calarasi	SLA	Slatina
CNP	Cluj Napoca	SMA	Satu Mari
CON	Constanta	SUC	Suceava
CRA	Craiova	TAR	Targoviste
DEV	Deva	TIM	Timisoara
DRO	Drobeta-Turnu Severin	TJI	Tirgu Jiu
DUX	???	TMU	Targu Mures
FET	Fetesti	VAS	Vaslui
FOC	Focsani	GIU	Giurgiu
GAL	Galati	IAS	Iasi

Resources

Ecuador's Maritime Command:
<http://www.puertosedecador.gov.ec>
Brazilian Navy:
<http://www.com7dn.mar.mil.br>

Russia vs. U.S. International Broadcasting

There will be no Radio Free Chechnya, at least not in the near future. Less than 48 hours before the Chechen service of Radio Liberty was supposed to go on the air in late February, the Broadcasting Board of Governors (BBG), the governing body which supervises Radio Free Europe-Radio Liberty, decided to postpone the North Caucasus broadcasts indefinitely. Russia's foreign policy elite reportedly seethed over the US decision to launch a north Caucasus service. Broadcasting in Chechen was seen as particularly offensive to Kremlin officials, who portray Chechen separatists as Islamic terrorists with links to the al Qaeda network. So writes Ariel Cohen, Ph.D., Research Fellow at the Heritage Foundation, in the *CDI Russia Weekly*, via Mike Terry.

Since when has any country had the right to control the output of another country's international broadcasts? This is a dangerous precedent. If not via RFE/RL, broadcasts in the languages concerned should go forth under the banner of the Voice of America.

Reorganizing U.S. Int'l Broadcasting - Again

Rep. Henry Hyde (R-IL), House International Relations Committee, has introduced legislation for another reorganization of U.S. international broadcasting. Part of his press release, via Kim Elliott:

"Establishment of the International Broadcasting Agency: The legislation reorganizes U.S. international broadcasting programs, now headed by a part-time Board of Broadcasting Governors, into an agency headed by a director. The reorganization is designed to ensure accountability by an identified decision maker while preserving the strengths of the Board. This reorganization will be accomplished with minimal disruption to existing broadcasting operations. The director will be appointed by the President – with the concurrence of the Senate – for a term of five years, similar to that of the chairman of the Federal Reserve System, with safeguards to preserve journalistic integrity from political influence. The present board of governors will be reconstituted as the Board of International Broadcasting (BIB) which will retain operational control of grants to entities including Radio Free Europe, Radio Liberty, and Radio Free Asia. The BIB will function in an advisory role to the International Broadcasting Agency."

AFGHANISTAN Commando Solo ended its broadcasts and returned to Pennsylvania March 19 (AP via Artie Bigley) So when did 8700-USB actually stop? (gh)

ALASKA KNLS, in English from March 24 to October 26: 0800-0900 on 11765, and 1300-1400 on 11870; October 26 to November 23: 0800 on 9615, 1300 on 11765 (via Alan Roe, DX Listening Digest)

BELGIUM [non] RVI A-02 English to NAm via Bonaire 15565 200 kW; 2230-2255 320 degrees, 0400-0425 350 degrees (Ivo and Angell, Observer, Bulgaria)

On its 20th anniversary DX-Antwerp will broadcast a special commemorative program via Krasnodar Tbilisskaya in Russia, May 25, 0800-0900 on 17785 (250 kW) and 9945 (100). Special very attractive QSL for correct reports. Five keywords will be given. If you note at least four, you can send them, together with a reception report to: DX-Antwerp, PO Box 16, B-2660 Hoboken, Belgium or qsl@dxa.be After verification, we will send you this special DX-Antwerp QSL card by mail (Guido Schotmans, hard-core-dx)

BOLIVIA 6537.27, Radio La Voz del Campesino, Sipe-Sipe, Cochabamba at 0100 UT. The station continues to be heard regularly both mornings and evenings but often with very weak signal. Rather professional with news and genuine, Bolivian folklore, also very frequency stable (Björn Malm, Quito, Ecuador, SW Bulletin)

BRAZIL R. Cacique, Sorocaba, SP, heard on reactivated 2470, at 0245 in early March. Had been silent for many years. I made sure this was not an image from MW (Michel Viani, Osasco, SP, radioescutas) I talked with a technician called Toninho at R. Cacique, who was very helpful. It's 24 hours on 2470 with 250 watts. Had been running only a few milliwatts to maintain license. Relays MW 1160 0930-0300, and musical FM 96.5 rest of night, but planned to move MW relay up to start 0730 (Marcelo Toniolo, NY, via Samuel Cássio, @tividade DX) Reception reports in Portuguese should be sent to Toninho (Departamento Técnico) at: comercial@radiocacique.com.br (Toniolo, Cumbre DX) Not reported since June 1987! (Anker Petersen, DSWCI DX Window)

R. Ribeirão Preto, 3205, is back on-air after long inactivity, good signal, political call-in, ID at 0342 (Rik van Riel, Curitiba, DX Listening Digest) 5035, at 2244, R. Educação Rural, Coari, Amazonas, pop music, ID in passing with UT -4 timecheck, audible only when R. Aparecida, SP, is off 5035 2200-2300 (Samuel Cássio Martins, Brazil, @tividade DX)

Rádio Difusora, Poços de Caldas (MG), promises to return to 4945 "with total force" after a period of electricity rationing when it signed off very early in afternoon (Director Fábio Zambrano, via Valtier Aguiar via Célio Romais, @tividade DX, DXCB)

CANADA RCI A-02 in English until Oct 27, to NAm/Carib via Sackville: 0100-0159 Am 5960 13670 15170 15305 1200-1459 NAm/Carib 9515 15305 17820 M-F 1300-1559 NAm/Carib 9515 15305

17800 Sat/Sun
2200-2229 Am 11920 15305 17880
2200-2229 Am 6175 9590 13670 17695
2230-2359 NAm 6175 9590 13670 17695
(Via Alan Roe, UK, DX Listening Digest)

RCI A-02 English to Europe/NW Africa/ME: 2000-2059 Sweden 5850, England 5995, 11690; Germany 11965; UAE 12015; Russia 15470; Canada direct on 15325, 17870; 2100-2129 Sweden 5850, England 7235, 13690; Canada 15325, 17870 (RCI website) Glad to see Sweden relay back as it was excellent last summer, but 5850 has ute QRM; may recommend slight move (Ken Fletcher, UK)

CHILE You can experience FM DX during the current F2 cycle: There are several wide-band FM stereo background/foreground music channels – some with so-called "beautiful music," some with AC/lite rock etc. On my Kenwood RZ-1 receiver (import version) that I use to monitor foreign TV DX, I can receive these often in stereo (punching up the stereo light on the RZ-1) with my 50 MHz (6 m band) stacked 7-element yagis. They are often strong enough that just about any VHF antenna (even modest ones) will pull them in. They were heard frequently around 2024 – this time of day is average for S. America DX, but try earlier and later, or on a scanner. Complete list of Chilean wide-band FM in the 47-49 MHz region: http://www.ham-radio.com/n6ca/50MHz/CE_musicfreq.html (Mike Cherry VE7SKA, Salt Spring Island, BC, Canada, W7FDA)

COLOMBIA 2319.72 harmonic, HJAU, Ondas del Ortegua. At 1100. ID and ads for companies in Florencia. Harmonic 2 x 1159.86 (Björn Malm, Quito, Ecuador, SW Bulletin)

CONGO DR R. Okapi began broadcasting Feb. 26, on FM in some cities, and shortwave 9550, a joint initiative of the UN mission in the DRC (known by its French acronym, MONUC) and the Fondation Hirondelle, a Swiss-based NGO, 24/7. News bulletins morning and evening, in French, Lingala, Swahili and Tshiluba. Main sponsors for the project are the British and Swiss governments. So far, project has a budget of about US \$1.63 million. (Integrated Regional Information Networks via AllAfrica.com via Mike Cooper)

Media Network contacted Chief of Information to the UN Mission in the Congo, David Smith, about Radio Okapi; initially using an old 10 kW Collins. Three ten kW are being built, due to be delivered end of March. Programs also delivered on satellite and Internet. No domain announced, though okapi.org has been registered. Main studio will be at MONUC headquarters in Kinshasa. All studios and transmitters will be on protected UN property and will have their own generators (© Radio Netherlands Media Network)

9550 went unheard by DXers for a few weeks, blocked much of the time by Havana, partly in French (gh) R. Okapi finally audible in mid-March, 2035-0145, 9550 USB+carrier, primarily "hi-life" music, occasional Okapi jingle ID. Signal kept improving, dominant over Cuba at 0145 (George Maroti, NY, Cumbre DX) Radio Okapi has some Web pages at <http://www.monuc.org/radio/radio.html>

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2x freq = 2nd harmonic; A-02=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

(Andy Sennitt) Initial schedule showed nothing but music between 2000-0430 (gh)

CUBA [non] R. Marti, very good on 29620 at 1200-1330 (José Elías, Venezuela, *Conexión Digital*) 4 x 7405, Greenville

DENMARK Drastic cuts in the SW staff of R Denmark Mar 23, reduced from four employees to zero! Even if hourly 25-minute broadcasts continue on a reduced number of transmitters, and partly depending on the Norwegian transmitting company "Norkring", the Danish programmes will no longer be specially edited for the audience abroad, but a repeat of the main domestic newscasts (Erik Kaie, Denmark, DSWCI DX Window) See also NORWAY

ECUADOR For A-02, HCJB moved English for India from 2330-0100 to 0200-0330 on 21470 (Swapan Chakroborty, India) Since it's a mostly darkness path, we suspected it would convert to a relay, but apparently not. Interesting propagational experiment. That's starting at 7:30 am IST instead of 5 am (gh)

HCJB A-02 English with powers, azimuths:
 0100 0400 9745 100 351 ENAm
 0100 0330 11960 50 330 NAM
 0200 0330 21470 100 40 India
 0330 0400 11960 100 330 NAM
 0400 0600 11960 100 327 NAM
 0400 0600 9745 100 324 WNA
 0600 0800 11680 250 36 Eu
 0700 1100 11755 100 228 SPac
 1100 1430 12005 50 43 Carib
 1100 1430 15115 250 352 NAM
 1100 1430 15115 250 128 SAM
 2000 2200 17660 100 41 Eu
 and:
 0100 0600 21455 30 35/225 Eu/SPac
 0630 1430 21455 30 35/225 Eu/SPac
 2030 2200 21455 30 35/225 Eu/SPac
 (via Volker Willschrey, Saar, DXLD)

FINLAND YLE Radio Finland A-02 in English to NAM: Mon-Sat 1230-1300 15400 17670; Sundays, 0000-0100 on 11990, 13730. The latter is presumably the *Capital Weekend* program, but it may be on hiatus for part of the summer (Joe Hanlon, DXLD) Frequency schedule says 0000 broadcast is Saturday only; meaning UT Sunday? (via Arto Muijnen, *World DX Club*)

FRANCE/TAIWAN RFI and RTI have reached an agreement for RFI broadcasts in Chinese to be transmitted from Taiwan; and in return, Issoudun, France, will transmit in French from the ROC to Africa; RTI could also use TDF for Chinese to the UK and northern France [which are in the skip zone of present relays via UK]. This should go into effect in March (Radio Taipei International via Jean-Michel Aubier)

GERMANY [and non] Deutsche Welle A-02 English to NAM, with powers and azimuths:
 0100-0145 6040 SACKVILLE 250 253 NAM
 9640 WERTACHTAL 500 300 N/CAM
 11810 ANTIGUA 250 340 NAM
 13720 SINES 250 290 N/CAM
 0300-0345 9535 SACKVILLE 250 277 NAM
 9640 ANTIGUA 250 340 NAM
 11935 SINES 250 305 N/CAM
 15105 BONAIRE 250 320 NAM
 0500-0545 9670 ANTIGUA 250 340 NAM
 9785 SINES 250 315 NAM
 11985 BONAIRE 250 320 NAM
 Note that two more broadcasts are partly to America; despite its early hour, the 0900 relay via Antigua to Oceania has long been well heard by awake Americans; now half a transmitter is actually aimed at us:
 0900-0945 6160 ANTIGUA 250 205 OC
 9510 ANTIGUA 125 235 OC
 9510 ANTIGUA 125 310 N/CAM
 And don't forget the West African broadcast which goes on to hit us:
 2100-2145 15135 KIGALI 250 295 WAF/AM
 (gh, from DW via Andreas Volk, Germany, ADDX via Wolfgang Büschel)

GUATEMALA Radio Cultural heard on 2570 // 3300 but with a much weaker signal, at 1005. Religious in Spanish. Believe this is a product, 3300 minus 730 MW (Hans Johnson, FL, *Cumbre DX*)

HUNGARY R. Budapest has resumed broadcasts in Italian, French and Spanish after more than ten years without them; Spanish is at 2045-2100 on 6025 6145; 2145-2200 on 6025 11885 (Luigi Cobisi, EDXC, *Noticias DX*)
 Radio Budapest, A-02 English:
 1900-1930 6025 7130 Eu
 2100-2130 3975 6025 Eu
 0100-0130 9560 NAM
 0230-0300 9570 NAM
 (via Andreas Volk via Wolfgang Büschel)

ICELAND AFRTS was heard for a few weeks in Feb-Mar on 3903-USB, best in northern Europe. It was eventually traced to Keflavik, and once the Icelandic authorities were made aware of it, was closed down (T S Bauge, Norway, DXLD)

INDIA A proposal to split the country into two time zones was rejected, but putting the entire country on DST of UT +6.5 April-September was being considered (*Times of India* via Mike Brooker, dx_india) See also PAKISTAN
 AIR station lists are available from: <http://air.kode.net/schedule/fqschl.html> No powers or schedules (Olle Alm, ARC MV-Eko Information Desk)

INDONESIA RRI Sorong, 4875, sign off time during Feb varied from before 1100 to 1200*. RRI Jayapura, 6071 sign off time varied 1037 to 1145* (Atsunori Ishida, Japan, *Jembatan DX*)
 VOI webcasts are now available: [\[ing.voi.asx\]\(http://ing.voi.asx\) \(Jean-Michel Aubier\) English 2000, all we heard was noise, like an open FM input \(gh\) Functioning another day, nice music at 2030 \(Ivan Grishin, Ont.\) Also try English at 0100, 0800. Another difficult-to-hear service via SW \(gh\)

IRAN \[non\] Clandestine Voice of Iran in Farsi: 1630-1730 on new 17525 co-channel Kol Israel due to technical error, in French/English, ex 15690; 1730-1930 on new 15690, ex 1630-1830 on 12065 \(Observer, Bulgaria\)

IRAQ Mother of Battles Radio, Arabic "1700-2000" on 11787 \(or once on 11785\) and 9715, not daily, but several times a week \(R. Petraitis, Lithuania, *Clandestine Radio Watch*\)

IRELAND See Shortwave Guide

ISRAEL Response from Minister Raanan Cohen's office: "There is a plan to eliminate all short-wave broadcasts and transmit them through the Internet. This will save about 6 million ILS paid by the Broadcasting Authority to 'Bezek.' My teacher at NYU's School of the Arts, Professor Falk, used to tell us that during the Second World War the Nazis were unsuccessful in their propaganda in the US because Americans do not listen to SW radio. I do not think that this fact has changed in any meaningful way since WW II. On the other hand, the Internet is rapidly becoming very popular all over the world. Sincerely yours, Lea Hermann, Bureau manager" \(via Daniel Rosenzweig, NY, DXLD\)

Kol Israel A-02; Don't take this new schedule to mean the broadcasts will continue. Letters were sent out which said that they would cease once the budget is ratified \(Daniel Rosenzweig, NY, DXLD\) So here is the new IBA schedule in English, nominally effective until October 27:
 0400-0415 Eu/NAM 15640 9435; SAM/Au 17600
 1030-1035 Eu/NAM 15640 17545
 1600-1630 Eu/NAM 15615 17545
 1900-1925 Eu/NAM 15615 11605 17545; SAF 15640
 \(Glenn Hauser, DX Listening Digest\)

KOREA SOUTH On at least two UT Mondays in a row, RKI's final webcast repeat in English at 0400-0500 was actually in Korean by 0430, causing us to miss *Multiwave Feedback* \(gh\)

KURDISTAN There appear to be two different clandestines known as Voice of Komala, due to a split in the organization two years ago, when most of the members of the Communist Party of Iran left it. One Voice of Komala is in Kurdish and Farsi *0325-0430* \(some days until 0500*\) on 4615 \(or 4610\) and 6810 kHz; and *1625-1800* on 4615 \(or 4610\) and 6810 kHz. On the latter, strong interference from anti Voice of Mojahed jumping jammer. This is the second VOK, website <http://www.komala.org> The original has a different website, <http://www.komalah.org> still linked to the CPI, and maybe also runs the V. of the CPI, and V. of Iranian Kurdistan \(R. Petraitis, Lithuania, *Clandestine Radio Watch*\)

LIBYA V. of Africa, 15435.51, 1819-1830+ IDs, English news at 1819, French 1821, back to English 1823-1830 with program about the "Revolutionary Committee's Movement." Back to French 1830. First time I have heard anything but regular news bulletins. Revolutionary Committee program repeated at 2122-2129. Very good signal. Parallel 17750 strong carrier but very weak modulation. 17750 covered by a very strong WYFR at 2000-2300. Regular English news bulletins also heard at: 1920-1922, 2032-2039, 2117-2119, 0026-0028 \(Brian Alexander, PA, DX Listening Digest\)
 \[non\] New A-02 schedule for LJB in Arabic \[via FRANCE\]: 11635 kHz 2000-2130 UTC; 15205 1800-2000; 15315 1900-2030; 15660 1600-1900; 17635 1700-1900; 17695 1100-1130; 17695 1500-1900; 17880 1700-1800; 21675 1100-1500; 21695 1000-1400; 21810 1100-1130; 21810 1500-1600 \(Observer, Bulgaria\)

MADAGASCAR In early March an elected and self-declared government each controlled some SW radio frequencies. The official one, which was neutral, on 5010, 6135 and 7155. And 5000 varying to 5003, 4990, and 9685, backed the self-appointed government of Marc Ravalomanana, the mayor of Antananarivo \(Mahendra Vaghjee, Mauritius, *hard-core-dx*\)

MALAWI TWR-Africa plans to put a one kW tropical bander on here, for nationwide coverage at night, transmitter provided by HCJB \(<http://www.tvrafrica.org/> via Pentti Lintuярvi, *hard-core-dx*\)

MÉXICO It took until late Feb for Radio México Internacional to post their B01 program grid as a PDF file: <http://www.imer.gob.mx/programacion/rmi.pdf> \(Mark J. Fine, DX Listening Digest\) So A-02 by August, maybe? In Spanish, they had some interesting additions, such as daily 0230-0300 *Ave De Mil Voces Con Opus 94*, evidently from the IMER classical FM station; alternate Mondays 0000-0100 *Tercera Llamada*. Wonder what that is about. And, yes, XERMX claimed to be on 9705 instead of 9288v FM. Last year, Mexico City did not go on DST until end of April, and uncertain whether it would this year. Check XERMX, 9705 and 11770, for the above shows and English one hour earlier than winter \(gh\)

R. Mil, 6010, still had *Encuentro DX* UT Sat 0600-0633. Clear frequency at this time and good modulation. This show used to have multiple airings \(gh, OK\)

NORWAY The company which owns the four transmitters at Kvitsoy and Sveio, Norkring, has been negotiating with foreign companies like Merlin to hire transmitting time on these rather new and modern transmitters, says Mr Christian Skottun from Norkring. They can easily be updated for Digital Radio Mondiale \(DRM\). Merlin seems interested, and conducted some tests in Jan for HCJB. Most of the Merlin transmitters in the U.K. are old and have to be taken out for possible refurbishment to DRM. In the meantime the Norwegians could hardly come in as provisional replacement \(Bernt Erjord, DX-News via DSWCI DX Window\) see also DENMARK; many scheduled transmissions are subject to cancellation if time can be sold to another broadcaster \(via Joe Hanlon\)

OMAN Tentative A-02 schedule for new BBC site on mainland abbreviated as SLA shows 250 kW on a number of frequencies from the 6 to 17 MHz bands, including: 17615 2200-2330 and 17700 1100-1700 \(Noel R. Green, UK, BC-DX\)

PAKISTAN Is all set to advance its clock by one hour to UT +6 from first](http://www.rrionline.com/stream-</p>
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Shortwave Broadcasting

weekend in April on trial basis to test the dual daylight shifting and save electricity (Deccan Chronicle, Hyderabad, India, via Jose Jacob, VU2JOS) Puts Pakistan in the absurd position of being half an hour ahead of India to its east, instead of half an hour behind – unless India also go on DST, as there has been some talk of doing, q.v. (gh)

PARAGUAY ZP20, R. América, 1480 has a new transmitter site, including SW. Have been testing various 7 MHz frequencies to Buenos Aires. Future target areas are the Cono Sur and Andes regions. Web: <http://www.radiodifusionamerica.com.py> (Dom Mur, ARC MV-Eko LA News Desk) Dom Mur, Technical Advisor, Nemby in Metro Asunción, says they have been testing experimentally toward Buenos Aires on 7385, 7740, 7300, 7345 and 7375 with low power from 1 watt to 1 kW and provisional antenna. Would shortly test again with high-gain antenna and much more power (via Thord Knutsson, SW Bulletin) Per Tony Jones, PWBR, reports of R. América testing on SW are a hoax (Nicolás Éramo, Argentina, Cumbre DX) Plan to start testing April 7 with 184 degree beam toward Buenos Aires on 7300 with 5 kW, 24h in Spanish and some Guaraní, cultural format, lots of classical music. Will QSL promptly reports to fax: 595 21 963 149 or Radiodifusión América, Casilla 2220, Asunción (Dom Mur, via Thord Knutsson, via Horacio Nigro, Conexión Digital) Depending upon results, may begin construction of second directional antenna targeted 310 degrees to Northern Argentina, Northern Chile, Bolivia, Peru and the rest of the Andean Region. These would also enter into Central America and the western North America. The 184 degree antenna is a corner reflector, horizontal beamwidth 22.5 degrees, vertical take-off angle between 3 and 27 degrees, and about 25 dBi gain (Dom Mur, Conexión Digital) It's not a hoax, as confirmed in a quick E-mail from the director of the station, José A. Holowaty, formerly with KGEI San Francisco, closed eleven years ago (Henrik Klemetz, Sweden)

PERÚ The Radio Oriente [6190] web site <http://www.dxing.info/radio/oriente/> has been created and uploaded by Finnish DXer Mika Mäkeläinen. Has been authorized by the station, a commendable initiative (Henrik Klemetz, Sweden, World of Radio)

On 2257.2, Radio La Mejor, Tumbes (2 x 1130 harmonic), 1023 ID "...en La Mejor, mil ciento treinta..." Good sustained signal (Mark Mohrmann, Coventry VT, DX Listening Digest)

Radio Frecuencia Popular, unknown QTH, departamento de Cajamarca (?) heard at 1100 on 4161.42 and its sesquiharmonic 6242.13; DJ's mike is of bad quality but much better on the latter.

On 6642.72, Radio Comercial, Lajas, Chota, Cajamarca at 0200, heard for a few weeks, unlisted either on SW or MW, a mystery! Regular, weak signal and frequency stable with somewhat "broken" audio. Blocks of ads every hour and halfhour from Lajas, Chota, Cajamarca and Nuevo Jerusalén. Music program called *Perú Andino*. (Björn Malm, Ecuador, SW Bulletin)

PORTUGAL R. Portugal, weekends only on 15540, heard at 1345-1400 on x2 = 31080 (Steve Lare, MI, DX Listening Digest) Same date at 1810 with football (David Hodgson, TN, harmonics yahoo group)

SOUTH AFRICA Radio Veritas Productions in Troyeville announced on its website that it will begin SW broadcasts May 1, at first four hours daily. Appears RVP will be leasing time, site not identified. See <http://za.op.org/veritas/> (Catholic Radio Update)

SPAIN On 14911.5, Radio Exterior de España in wide FM! 1555 to 1644 UT, with a huge signal. Why would REE want to transmit an FM signal on 14 MHz? (Tim Bucknall, NW England, BDXC-UK)

SWEDEN R. Sweden A-02 English to NAm: 1130-1200, 1230-1300, 1330-1400 on 18960; 0230-0300, 0330-0400 on 9490 via Canada (via Alokesh Gupta, DXLD)

SWITZERLAND See Shortwave Guide

TAIWAN [non] Radio Taipei International's wonderful program *Instant Noodles*, features news of the bizarre, weird, and stupid, Thursday 2215 on 9355 via WYFR (Ted Schuerzinger, swprograms) Presumably on some other UT Thursday broadcasts. See also FRANCE

THAILAND See Shortwave Guide

TURKEY See Shortwave Guide

TURKMENISTAN Turkmen State R has three daily newscasts in English as part of its home service: 1300-1310 (exc Sun) on the "Watan" channel (5015) and 0840-0850, 1540-1550 on the "Char tarapdan" channel (4930). Source: *Harbarlar* newspaper provided by Sergey Kolesov, Ukraine (Bernad Trutenau, Lithuania, BC-DX)

UKRAINE RUI has added live webcast including English (Phillip M. Dampier, NY, DX Listening Digest) Winter timing not heard at 1200, but at 2200, 0100, 0400, so now at 2100, 0000, 0300. English DX program 24 minutes into Sat/UT Sun, then mailbag *Hello From Kyiv*, filled with Ukrainian folk music. Also *Music from Ukraine* on Sundays/UT Mondays, from 22 minutes onward. Direct link is <rtsp://real.nrcu.gov.ua:7554/encoder/rui.rm> (Ivan Grishin, Ont., DX Listening Digest) Station certainly needed webcasting with SW transmitters ailing and heavy accents hard to understand (gh)

U K Penny Vine says *Write On* is now a 52-week-a-year programme after one missing edition in March (Will Martin, MO, DX Listening Digest)

[non] Radio Ezra, from April 6: 2330-0000 UT Sat only on 17665 to North America (John D. Hill, Water Into Wine Ministry via Alokesh Gupta, New Delhi, India) Site? Probably for three months through June

U S A We have had many requests from listeners to visit our transmitter facilities. Our policy is: ABSOLUTELY no visitors: no exceptions. Anyone who trespasses upon WWRB, WWFV, or Blue Ridge communications, will be arrested and subsequently prosecuted for Trespassing. Criminal intent to inflict damage, Terroristic threats and acts (felonies). Our staff has been instructed to call the local sheriff / 911 if anyone crosses over our fences or gates. Please advise listeners to govern themselves accordingly (Peter J. Taggart, Operations manager via Dave Frantz) A visitor to WWRB, near Manchester, TN, quotes the sign on the gate: "WARNING: THIS FACILITY

IS USED IN AIR TRAFFIC COMMUNICATIONS. LOSS OF HUMAN LIFE MAY RESULT FROM SERVICE INTERRUPTION. ANY PERSON WHO INTERFERES WITH AIR TRAFFIC COMMUNICATIONS OR DAMAGES OR TRESPASSES ON THIS PROPERTY WILL BE PROSECUTED UNDER FEDERAL LAW."

But the sign doesn't cite any statute, ordinance, or anything else. The sign is obviously a lie, no doubt inspired by Dave Frantz's alleged former career in the FAA. It's an international SW broadcasting station, with the towers holding up the rhombic visible, nothing to do with ATC. So can we believe anything WWRB tells us? (Glenn Hauser, OK, DX Listening Digest) WWRB, 6890, strong and clear into Sydney, Australia, at 0700. A rather disturbing mix of race hate, pro-gun, anti-government and religious venom (something really scary about these people). (Jem Cullen, Australia) BTW, FCC schedules still list this only as WGTG (gh)

I happened across 15725, WRML, March 1 around 1415 and listened for a few minutes. The speaker was claiming there is no evidence a plane crashed into the Pentagon on Sept. 11, and evidently the USG was behind the damage there and in New York. How can Jeff White live with himself, allowing such garbage to be broadcast on his station? (gh)

Due to a serious dispute involving a program on the Christian Media Network, which has been on WBCQ for two years, WBCQ had to suspend broadcasts of CMN from 9335 for a few days until the matter was resolved. Many, many, many free speech issues came up, raising the question how far can a program go. WBCQ was faced with a lawsuit over this. It was gut-wrenching for Allan (Allan Weiner Worldwide, PA)

Besides the usual schedules on 7415, 9335 and 17495, WBCQ has registered a fourth frequency for A-02, 11660 at 1300-0500, like all the others, 50 kW at 245 degrees for 'southern NAm' (George Jacobs and Associates via Hansjoerg Biener, BC-DX)

It was a mistake to eliminate music from VOA when News Now was formed; soon there will be an hour of music back on the NN schedule. VOA should broadcast in more languages, and expand programming in some existing languages. VOA should be 'rebuilt,' and extend reach to troubled areas, such as the Horn of Africa (VOA Director Bob Reilly on Press Conference USA)

VOA has a contract for \$1 million a year for up to four years with a Baltimore communications firm to boost overseas audience. Eisner Communications has billed VOA about \$130,000 so far; partly to come up with a new logo for VOA. But Sen. Jesse Helms objected to a proposed "many voices" theme, instead of one voice (Al Kamen, Washington Post)

VFW Post 7696 wants to open a museum on the site where VOA broadcasts were beamed behind the Iron Curtain during the Cold War. The original 600-acre VOA 'Bethany' site in Union Township, OH, contained a network of radio towers. The Ham Radio Operators Association is considering erecting a working tower if a museum is opened in the former broadcast building (AP via Artie Bigley)

Please visit WMLK Radio's new web page at <http://www.wmlkradio.com> (Gary A. McAvin, Cumbre DX) Says about to fire up the new 250 kW, photos of Elder, equipment (gh)

WWV and WWVH propagation info changed format March 12. Explanation: <http://www.sec.noaa.gov/Data/info/WWVdoc.html#samples> (Glenn Hauser, DX Listening Digest)

KRON-TV, 11m feeder on 26450 NBFM, at 0214, local KRON 4 news at 6 pm perfect for ID purposes. Call letters not spelled out, but pronounced as a word. Then I heard two female technicians speak over the feed for a while. 26450 NBFM, KMGH-TV (feeder), Denver, at 1759 promo for upcoming story on "7 News at 5:00, today." More Denver TV stations' NBFM links heard: KUSA, 26350 at 2300 and 26450 an hour later. Also KMGH on 26400 at 2358, instead of 26450 (David Hodgson, TN, DX Listening Digest) Also on 26450 FM, KTRK-TV Houston TX; 2145-2230+ with News at 4 (Harold Frogde, MI, MARE Tipsheet)

UZBEKISTAN Another R. Tashkent 3rd harmonic noted at 1400 on 15120. Fundamental is 5040. Seems every Uzbek transmitter radiates harmonics at least up to 3rd (Vladimir Kovalenko, Toms, Russia, Signal)

VIETNAM [non] VOV relay via Canada A-02 stays on 6175 unlike last summer on 9 MHz, which is much better against T-storms and late sunsets (gh): 0100-0500 all on 6175 includes: 0100-0130 English, 0130-0230 Viet, 0230-0259 English 212 USA; 0300-0330 Spanish, 0330-0400 English, 0400-0459 Vietnamese 268 USA (RCI via Bill Westenhar, QB)

Radio Free Vietnam now only on Sat at 1500. Que Huong now just 1230-1300 Mon-Sat. All on 9930. Both have reduced their schedules (Hans Johnson, Cumbre DX) via KWHR Hawaii

WALES [non] A-02 Celtic Notes in English via Merlin:

2030-2100 Fri 7325 Skelton 300 kW / 110 deg to Eu
0200-0230 Sat 9795 Rampisham 500 kW / 300 deg to NAm
1230-1300 Sat 17615 Rampisham 500 kW / 062 deg to Au/NZ – but 17615 is co-channel Voice of Turkey in Turkish and RDP International in Portuguese! (Observer, Bulgaria)

ZIMBABWE ZBC reported that the Guinea Fowl transmitters have been resuscitated with new spare parts, operating at full capacity. Stations are National FM, formerly Radio 4 and Radio Zimbabwe, still known to many as Radio 2 (Spencer Chirume, ODXA) Just before the election in early March, no coincidence. SW outlets on 6045, 5975 were again being heard around 2000-2230 (Chris Hambly, Australia)

[non] SW Radio Africa extra broadcast at 1100-1200 on 11670 audible here but not strong; roughly same strength as the BBC on 11940 at the same time from South Africa. And both peak on the same directional aerials (Chris Greenway, Kenya, DX Listening Digest)

A-02 schedule for Voice of People via Madagascar 50 kW, 265 degrees: 0330-0425 7310 new morning transmission; 1630-1755 7215 retimed, ex 1700-1825 (Observer, Bulgaria)

Until the Next, Best of DX and 73 de Glenn!

0007 UTC on 12080

CHINA: XIZANG. Chinese announcements plus music // 11915. CPBS 11835 0025 // 11610. (Stewart MacKenzie, CA). **CPBS** 4850, 2219-2232+, cultural program and interview. SIO 342+ to 2300*. **China Radio Int'l** 1438-1442+ on 9700 with Chinese cat-strangling music. SIO 353. (Harold Frodge, Midland, MI)

0038 UTC on 11675

KUWAIT: Radio Kuwait. Arabic music to identification. Program line-up to comments. (MacKenzie, CA) 1836-1841+. Newscast and ID to 1840. SIO=3+44. (Frodge, MI)

0044 UTC on 4835

PERU: Radio Marañon. Spanish. Music program *Cumbia Andina* to time check. Evening messages to Andean music and identification. (Arnaldo Slaen, Buenos Aires, Argentina). **Radio Quillabamba** 5025, 1020-1025; Radio Union 6355, 0710-0176; **Radio Bambamarca** 1030 on 4420. (Fernando Garcia, Baltimore, MD)

0105 UTC on 6165

NETHERLANDS ANTILLES: Radio Netherlands relay. World newscast focus on Israel's suicide bombings. (David Weronka, Benson, NC) Netherlands's Canadian relay 1609 on 15220. (Moser, IL)

0115 UTC on 11840

ECUADOR: HCJB. *Studio 9 to Morning in the Mountains* at 1230 on 15115. (Bob Fraser, Cohasset, MA) HCJB 3220, 0233-0236 Quechua service. (Slaen, ARG)

0200 UTC on 7250

RUSSIA: Voice of Russia. Interval signal to ID and regional news. (William McGuire, Cheverly, MD) 5940 at 2045. Report on Russian holidays. (Fraser, MA) Interval signal 2055 to *2100. Station ID to national news. (Frodge, MI)

0230 UTC on 9495

SWEDEN: Radio Sweden. ID to *Sixty Degrees North* segment. (McGuire, MD). 6065, 2235-2248+. (Frodge, MI) 18960 at 1448. (Fraser, MA).

0242 UTC on 11787

IRAQ: Radio Iraq Int'l. Traditional music to ID, "this is Radio Iraq International," with minimal interference. Audio typical Middle-Eastern over modulated voice. (Mark Fine, Remington, VA)

0309 UTC on 4810

ARMENIA: Voice of. Local music to 0530 announcement. Spanish station ID to newscast and folk music. Fair signal monitored in LSB due to RTTY on upper sideband. (Fine, VA)

0340 UTC on 6265

ZAMBIA: ZBC. Afro music to local language commentary between tunes. "Zambia" at 0400 and "ZBC" identification and drum/choral chant. (Frodge, MI)

0343 UTC on 6955

PIRATES: Crunch Radio. "Music that makes sense" promo for 1930-40's music. SIO=444. **Sycko Radio** 6955 USB, *0410-0427+. ID, "Low Fidelity Radio/Crap Radio" 0418, "Sycko Radio" at 0424. (Frodge, MI) **Rock-it-Radio** 6270.71 with *La Bamba* tune. (David Hodgson, Nashville, TN/Pirates SW Group)

0750 UTC on 9510

FINLAND: Radio Finland. Agricultural report. *Capital Cafe* 17660 // 15400. (Fraser, MA).

0830 UTC on 6090

CHILE: Radio Esperanza. Spanish. Gospel music to extended ID as "En Temeco, Chile," with frequency quote. Interference from Brazil's **Radio Bandeirantes**. (Slaen, ARG) **Radio Voz Christiana** 21500, at 2022. (MacKenzie, CA)

1000 UTC on 5009

DOMINICAN REP.: Radio Cristal. Program relay from **Radio Pueblo**. (Garcia, MD). News, sports and ID 5009, 2324-2332+. (Frodge, MI) **Radio Barahona** 0200 on 4930. (Garcia, MD)

1045 UTC on 5020

SOLOMON ISLANDS: SIBC. Island music to Honiara address and fax number. "Hapi Isle" ID to national anthem 1102. BBC news relay 1200. (Garcia, MD; Frodge, MI)

1100 UTC on 9580

AUSTRALIA: Radio Australia. *Waltzing Matilda* tune to ID and national news. (McGuire, MD) 1220 on 9580, report on the British Army hospitals of the 1850's. (Fraser, MA) Newscast to ID 2110 on 21740. (MacKenzie, CA) **VL8A Alice Springs** 2310, 1013-1020+ with cricket game, 2325 & 2485 barely audible. (Frodge, MI) 0935 on // 2325 **Tennant Creek** //2485 // **Katherine**. (Fine, VA; Glenn Bowman, MI; Fraser, MA)

1154 UTC on 9600

CUBA: Radio Rebelde. Spanish. Tango music to ID at 1159, best to monitor in LSB. **Radio Havana** 2105-2112+. **China Radio Int'l** relay 5990, 2300-2316+. (Frodge, MI)

1430 UTC on 9845

JAPAN: Radio Japan. Report on Japanese beverages, SIO 343. (Frodge, MI) Japan's Canadian relay 1100 on 6120. (Bowman, MI)

1511 UTC on 9335

NORTH KOREA: Radio Pyongyang. Commentary on reunification and concern on Japan's military positioning. Poor modulation //11710 very weak. (Howard Moser, Lincolnshire, IL) 11335, tent. 2208-2232, drifting freq to 11335.13 (Fraser, MA)

1815 UTC on 15435

LIBYA: Radio Jamahiriya. Tentative. Arabic service to 1819, followed by English news. SIO=4+44. Signal audio level fair-good, // 15415 not audible. (Frodge, MI)

1843 UTC on 11910

GEORGIA: Georgian Radio. News and commentary to local music and 1857*. Signal weak to fair with VOA interference. (Fine, VA)

1942 UTC on 9890

IRAN: VOIRI. Commentary on CIA, SIO 2+43 best in LSB to avoid **Radio Netherlands** on 9885, // 11695 weak // 15140 weak. Audible 1948-2003+ on 15140 // 9890 // 7175 not audible. (Frodge, MI; Fraser, MA).

1955 UTC on 9760

GREECE: VOA relay. Cultural report. (Fraser, MA) 17705 at 2037. Greek music program. (MacKenzie, CA)

2004 UTC on 15160

NEW ZEALAND: Radio NZ Int'l. World news to national weather, SIO 242. (Frodge, MI) 0727-0802 on 15349, SIO 343. (Daniel Canonica, Muggio, Switzerland)

2010 UTC on 21815 USB

COSTA RICA: RFPI. Religious programming // 15040, audible 2015+. (MacKenzie, CA).

2030 UTC on 11620

INDIA: All India Radio. Regional news to letters. (Weronka, NC) 2203-2212 on 11715 with news, IDs and update on India/Pakistan relations. Fair signal, SIO=141. (Canonica, SUI; Frodge, MI) 11620 // 7410 at 1850. (Fraser, MA).

2120 UTC on 9988

EGYPT: Radio Cairo. International news to sports report. (Bowman, MI). 9900 at 2330 with Arabic music. (MacKenzie, CA).

2224 UTC on 15280

ARGENTINA: Radio Diez. Spanish talk to pop music and commercials. Station ID, "Radio Diez," ID. SIO=243. **RAE** 15345, *2300 ID. (Frodge, MI)

2228 UTC on 5990

BRAZIL: Radio Senado. Portuguese. Music program to ID and time signal. SIO 322. (Canonica, SUI) **Radio Brasil Central** 4985, 2332-2345; **Radio Educacao Rural** 4755, 2252-2305+ (Frodge, MI); **Radio Senado** 2200 on 5990; **Radio Universo/Radio Tupi** 2200 on 11765. (Garcia, MD); **Radio Globo** 9586, 1940-1945. (Slaen, ARG).

2230 UTC on 7130

ALBANIA: Radio Tirana. Interval signal at 2229 to English sign-on at 2230. Station ID to frequency quote. Commentary on Albanian economy to *Albanian Press Review*. SIO=3+43+. (Frodge, MI)

2249 UTC on 5985

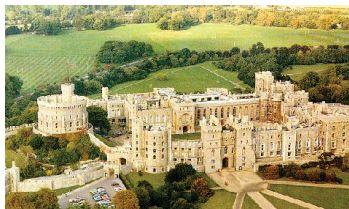
CONGO: Radio Congo. Spanish. Afro tunes to 2259 "esta es Radio Congo" ID. Interference from WYFR *2300 and unknown co-channel sign-on. (Frodge, MI)

2333 UTC on 6460.9

PIRATES-SOUTH AMERICA: Spanish. Folk music to Argentine national anthem. Chat to ID, "usted esta sintonizando a Radio Bosques, desde Buenos Aires, en la Republica Argentina." **Radio Pirana Int'l** 11420, 2355-0025. Listener's letters to ID, "amigos de Radio Pirana Internacional." (Slaen, ARG)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail
gayle@webworkz.com) Please note: paper strips and cassette
recordings will no longer be accepted.
English broadcast unless otherwise noted.

Celebrating The Queen's Jubilee



Castle, to celebrate the Queen's 50th Anniversary of her succession to the throne.

Windsor Castle is the perfect location for this high profile, prestigious jubilee event, celebrating not only a landmark in British history, but an opportunity for all radio enthusiasts to promote international goodwill.

From *OPDX*, comes word of a special event of interest to amateur radio operators, short-wave listeners and anglophiles! The unique callsign GB 50, has been issued by the United Kingdom Radiocommunications Agency for a special event station to be established at Windsor

The station will be operated from May 29 - June 9, 2002, by the Cray Valley Radio Society (CVRS), in association with Burnham Beeches Radio Society and with the support of the Royal Society of Great Britain. Activity will be on the all bands from 3.5 - 50 MHz on CW, SSB, PSK31 and RTTY. A 144 MHz station will also be active on CW, SSB and FM. The station will operate from 0700 - 2200 UTC daily, allowing for simultaneous operation on several bands.

The QSL Manager plans to issue an attractive commemorative card. Your report or personal card may be sent to the ARRL bureau, or direct to Owen Cross-G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF, England.

A website has been established and will be updated with the latest news at <http://www.gb50.com>. Don't miss out on this special, once in a life time, golden jubilee.

AMATEUR RADIO

Ascension Island-ZD8Z, 10 Meters USB. Full data color scenery card, plus personal note and color pocket calendar. Received in 18 days for an SASE and two US dollars. QSL via QSL Manager, VE3HO, Garth Hamilton, P.O. Box 1156, Fonthill ON Canada L0S 1E0. (Larry Van Horn-N5FPW, Brasstown, NC)

Egypt-SU9ZZ, 10 Meters USB. Full data color *King Tut* card. Received in 80 days for one US dollar and a nested Euro envelope (used for reply). QSL via QSL Manager: OM3TZZ-Jaroslav Jamrich, hejzu Dusika 43, Trnava 91708 Slovak Rep. (Van Horn, NC) DXCC # 135.

Greenland-XP1AB Kangerslussuaq ARC. 10 & 15 Meters USB. Full color QSL card via OZ1ACB. Received in 120 days for one US dollar and a nested Euro envelope. (used for reply). QSL Manager address: Allis Andersen-OZ1ACB, Kagsaavej 34, DK-2730 Herlev, Denmark. This was a special DXpedition conducted during the 2001 CQ WW DX Phone Contest. As of November 21, 2001, the Greenlandic telecommunications authority recalled the license of XP1AB that was assigned to Kangerslussuaq ARC. It will never be possible to work XP1AB on the ham bands again. (Van Horn, NC)



CYPRUS

Cyprus Broadcasting Corp., 9760 kHz. Color transmitter/studio card signed with

illegible initials by General Director. Received in 32 days for an English report, two IRCs and a souvenir postcard. Station address: CYBC, P.O. Box 4824, Nicosia, Cyprus. (Tom Banks, Dallas, TX)

Northern Cyprus-Radio Bayrak Int'l, 6150 kHz. Two no data station folder cards with station information, with no mention of it being a QSL. Letter included from Mustafa Tosun. Received in one month for an audio CD of two consecutive days of programming, one IRC and one US dollar. (George Maroti, NY/Cumbre DX) Nice catch, George, not seen often! - ed.

MEDIUM WAVE

Algeria-Radio Algerienne, 252 kHz AM. Full data QSL card and sticker. Received in 40 days for an AM report. Station address: 21, Boulevard des Martyrs, Alger, Algeria. (Daniel Canonica, Muggio, Switzerland)

Canada-CJME, 980 kHz AM. Partial data scenic post card, signed by David M. Senft-Vice President of Engineering. Received in 13 days for an AM report. Station address: 210-2401 Saskatchewan Drive, Regina SK Canada S4P 4H8. (Patrick Griffith, Westminster, CO)

KATQ, 1070 kHz AM. Prepared QSL verified by C. Symne. Received in 375 days for an AM report. Station address: 112 3rd Avenue East, Plentywood, MT 59254. Medium wave QSL # 2, 780. (Patrick Martin, Seaside, OR)

KBUL, 970 kHz AM. Folding QSL card signed by "Bell", plus signed business card from Tommy Braaten-Program Director. Received in 11 days after a follow-up AM report. Station address: P.O. Box 1276, Billings, MT 59103. (Martin, OR)

KMTI, 650 kHz AM. Partial data letter signed by Douglas Barton-Owner/Manager, plus bumper stickers and business card. Station address: 1600 W. 500 North, Manti, UT 84642. (Griffith, CO)

KNX, 1070kHz AM. Full data QSL card signed by Larry Wichman-Director, Tech. Operations. Received in three weeks for an AM report and souvenir postcard. Station address: 6121 Sunset Boulevard, Los Angeles, CA 90028. (Don Dacus, Russellville, AR)

US Virgin Islands-WDHP, 1620 kHz AM. Verification letter signed by Beverly Meyers-Ops Manager. Very pleased with this, delivered on my birthday! Received in 22 for an AM report, Station address: #79A Castle Coakley, Christiansted, St. Croix, US VI 00820. (Martin, OR)

THAILAND

Radio Thailand, 15395 kHz. Full data unsigned QSL plus frequency schedule. Received in 138 days for an English report and two US dollars. Station address: 236 Vibhavadi Rangsit Highway, Din Daeng, Huaykhwang, Bangkok 10400, Thailand. (Joe Squashic, Wake Forest, NC)

TURKEY

Voice of, 9655 kHz. No data QSL, plus program schedule and station stickers. Received in 19 days for an English report. Station address: Shortwave Centre, Box 78, Yleisradio, Helsinki, Finland. (Squashic, NC)

UTILITY

Monaco-3AB, Monaco Telecom, 17260 kHz USB. Handwritten verification on MR's card, signed by G. Labess. Received in nine days for a utility report. Station address: Boite Postal 98008 Monaco Cedex. (Zacharias Liangas, Thessolniki, Greece/HCDX)

Malaysia-9MG, Pinang Island, 12943.5 kHz USB. Full data verification letter signed by Adriana Larkin. Received in 28 days for a utility report and one mint stamp. Station address: 550 Pilgrim Drive, Foster City, CA 94404. (George Clement, Powder Springs, GA)

Programs on DXing, SWLing, and the Media

It's time for our semi-annual review of media-related programs on shortwave. We continue to experience losses in the broadcast time devoted by international broadcasters to this genre of programs. Over the past six months, **HCJB's DX Partyline** has been reduced to thirty minutes from fifty and *Ham Radio Today* has been shortened to about a ten minute weekly segment within the daily magazine *Studio 9*. *Communications World* has been dropped from **VOA's** schedule entirely.

There are probably larger, more generalized reasons for this trend. Among these could be the shifting focus on the part of many stations toward attempting to attract a wider audience by appealing more to those not drawn to international broadcasting by a technical or hobbyist interest in shortwave. Another could be the fact that the Internet and e-mail have largely supplanted the radio as the quickest, most efficient means of sharing the kinds of information that have been the hallmark of DX and SWL programs.

In the cases of *DX Partyline* and *Communications World*, however, the reasons appear to be more localized. **HCJB** has reduced its transmission times and shortened nearly all of its locally produced programs as a cost-cutting move. *Communications World* appears to have been an indirect casualty of the war on terrorism. It seems that even something as innocuous as identifying transmitter locations of surrogate broadcasters like *Radio Free Asia* is information that the **VOA** is uncomfortable sharing.

Fortunately, there is still a selection of programs that seem to retain their own focus. *World of Radio* gives a comprehensive activities report on the HF broadcast bands, including frequencies, personalities, station and program information. *DXers Unlimited* tends toward light technical topics. *DXing with Cumbre*, whenever possible, likes to emphasize new DX catches. *The Media Report* is unique for looking at the motivations behind the mass media and those who seek to influence it, both at home (in Australia) and abroad.

A few, such as *Ask WWCR* and *Feedback*, concentrate solely or primarily on information about their own respective stations. Of course, *DX Partyline* remains and it continues to serve both new and seasoned DXers and SWLers by providing a place for the clubs to impart information about their events and projects, and by reading reports from listeners around the world about what is being heard on the bands in their respective regions. The rest, more or less, look at

the hobby or at media from the point of view of those who are a part of it in their respective home countries.

For most stations, refer to the *Shortwave Guide* pages for frequency information. (Some listings below have frequency information to clarify which of the station's multiple services is carrying the program.) The one letter day abbreviations track that are as used in *MT's Shortwave Guide* section. Times are approximate and both times and frequencies are subject to change.

Ask WWCR:

On **WWCR** - F 2000 (15685); A 0845 (5070); S 0145 (5070), 1015 (15685); T 0500 (5070), 0945 (9475).

CIDX Report:

On **R. Canada Int.** - S 2007; M 0107, 0207; W 2035; H 0135, 0235 (fortnightly within The Maple Leaf Mailbag program).

Continent of Media:

On **R. for Peace Intl.** - F 1900; A 0100, 0700, 1300, 1730, 2330; S 0530, 1130; T 2000; W 0200, 0800, 1400. (Note: Although heard weekly, program is updated monthly.)

Cyberline:

On **WWCR Tennessee** - S 0400 (3215 & 5070).

DX Blackbuster:

On **R. Budapest** - A 1905, 2135; S 0105, 0235.

DX Corner:

On **Voice of Turkey**, fortnightly - F 2040; A 1245, 1845, 2215; S 0315.

DXers' Corner:

On **All India Radio**, fortnightly - M 1840, 2130; T 2340.

DX Partyline:

On **HCJB Ecuador** - F 2300; A 0600, 2000; S 0100, 0400.

DXers' Special:

On **RAE Argentina** - W 1845; H 0245.

DXers Unlimited:

On **R. Habana Cuba** (in two weekly editions) First edition - A 2110, 2310; S 0140, 0340, 0540.

Second edition - T 2105, 2310; W 0140, 0340, 0540.

DXing with Cumbre:

On **WHRI Indiana** - A 0500 (5745 & 7315), 0730 (5745 & 7315), 1200 (6040), 1230 (15105), 1800 (13760), 2230 (9495); S 0000 (5745), 0330 (7315), 0630 (5745), 2100 (5745), M 0330 (7315).

On **KWHR Hawaii** - A 0600 (17780), 1000 (11565), M 0300 (17510).

On **WHRA Maine** - F 2100 (17650); A 0430 (7580), 1900 (17650), 2130 (17650); S 0230 (7580), 0730 (7580).

Feedback:

On **R. Australia** - F 2105; A 0005, 0605; S 0305.

Ham Radio Today:

On **HCJB Ecuador** - T 2320; W 0720, 2020; H 0120, 0420.

Mailbox:

On **R. New Zealand Intl.** (fortnightly) - M 0705, 2135; W 1735; H 0305; F 1930

Media Report:

On **R. Australia** - H 0130, 1030, 1530, 2330.

Multiwave Feedback:

On **R. Korea Intl.** - S 0835, 1105, 1335, 1635, 1935, 2135, 2205; M 0235.

Radio Bulgaria Calling:

On **R. Bulgaria** - F 1945, 2345; A 1145, 2145; S 0245.

Radio Waves:

On **R. Exterior de Espana** - A 2140; S 0040, 0140, 0540.

Radio World:

On **R. Vlaanderen Intl.** - S 0700, 1030, 1130, 1730, 2230; M 0400.

RNZI Talk:

On **R. New Zealand Intl.** (fortnightly) - M 0705, 2135; W 1735; H 0305; F 1930

Spectrum:

On **WWCR Tennessee** - S 0300 (5070); M 0600 (3210).

The Real Amateur Radio Show:

On **WBCQ Maine** - A 2300 (7415).

Viva Miami:

On **WRMI Florida** - S 0430 (7385).

Wavescan:

On **Adventist World R., Austria** - S 0100, 0830, 1530, 2130

On **Adventist World R., Dubai** - S 0030, 0330, 1300, 1330, 1630

On **Adventist World R., Slovakia** - S 2030

On **KSDA Guam** - S 1000, 1300, 1330, 1430, 1630, 1730, 2130

On **WRMI Florida** - M 0330 (7385).

World of Radio:

On **WBCQ Maine** - H 0030 (7415), 0600 (7415).

On **WWCR Tennessee** - H 2030 (15685); F 0930 (9475), 2115 (15685); S 0230 (5070), 0630 (5070); M 0500 (3210).

On **R. for Peace Intl.** - F 1930; A 0130, 0730, 1330, 1800; S 0000, 0600, 1200; T 1900; W 0100, 0700, 1300.

Finally, while the popular programs *Media Network* and *MediaScan* no longer exist as radio programs, they continue in text format via the Internet and as e-mail newsletters. **Radio Netherlands** hosts the *Media Network* web site <http://www.rnw.nl/realradio/index.html>, and *Media Scan* can be accessed via the **Radio Sweden** web site at http://www.sr.se/rs/red/ind_eng.html by clicking on "Mediascan".

Special thanks to Ivan Grishin, Glenn Hauser, Marie Lamb and John Norfolk whose valuable work has been included in this month's column. If you have information that can add to this listing or correct an inaccuracy, please provide it.

Until June, good listening!



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment prob-

lems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT MONITORING TEAM

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Program Highlights

John Figliozi

CHANGES, CHANGES, CHANGES

RVI - has folded the *Press Review* into *Belgium Today*.

YLE - has introduced a new hour-long magazine *Capital Weekend*, which airs to North America Mondays at 0000.

BBC - *The Greenfield Collection* has ended its long run now that Edward Greenfield has retired. I, for one, will miss that distinctive voice. (Incidentally, Greenfield recorded this program in his home and used his own record collection—in case you didn't know.) Once a month, *Concert Hall* will play listeners' classical requests, including selections that were too long to play in a half hour program.

For the first time in memory, popular panel games like *Just a Minute* and *Quote, Unquote* do not appear on the schedule. Let's hope that this is not a permanent arrangement.

John Peel and *Charlie Gillett* now each get their own half-hours 52 weeks a year. *Westway* has been moved to Wednesday and Fridays. Programs have been repositioned so that listeners can hear science programs or arts programs or music programs at the same times each week-day. The schedule as a whole seems better organized and more accessible.

Focus on Faith and *Reporting Religion* have been combined into one half-hour program carrying the name of the latter. *UK Album Chart* and *Music X-Press* have been dropped in favor of a half-hour program titled *Revolver*, which features recording artists presenting their favorite music. Some other programs have switched from weekdays to weekends and vice versa.

Subscribers to **BBC On-Air**, the World Service's monthly printed program guide, will also note improvements. The oddly conceived and confusing categories of "Showcase", "Living" and "Insight" mercifully have been retired. In their place are more logical organizing titles like "Arts, Music and Entertainment", "Lifestyle, Culture and Beliefs" and "Science, Technology and Health". Also, a handy and simple alphabetical index to programs appears on a back page making the schedules much easier to use.



0000 UTC - 8PM E / 7PM C / 5PM P

0000	0015	Cambodia, National Radio Of	11940as				
0000	0015	Japan, Radio 13650as	17810as				
0000	0030	Australia, Radio	9660pa	12080pa	15240as	17580va	17750as
		17775pa 17795va	21740va				
0000	0030	Egypt, Radio Cairo	9900na				
0000	0030	Solomon Islands, SIBC	5020do				
0000	0030	Sri Lanka, SLBC	4940do				
0000	0030	Thailand, Radio	9690va				
0000	0030	Vanuatu, Radio	4960do	7260do			
0000	0045	India, All India Radio	9705as	9950as	13605as		
0000	0057	Canada, Radio Canada Intl	9640as	11897as			
0000	0100	Anguilla, Caribbean Beacon	6090am				
0000	0100	Australia, ABC NT Alice Springs	4835do				
0000	0100	Australia, ABC NT Katherine	5025do				
0000	0100	Australia, ABC NT Tennant Crk	4910do				
0000	0100	Australia, Radio Christian Voice	17775as				
0000	0100	Cameroon, RTV	4850do				
0000	0100	Canada, CBC Northern Service	9625do				
0000	0100	Canada, CFRX Toronto ON	6070do				
0000	0100	Canada, CFVP Calgary AB	6030do				
0000	0100	Canada, CKZN St John's NF	6160do				
0000	0100	Canada, CKZU Vancouver BC	6160do				
0000	0100	Costa Rica, R for Peace Intl	15040va	21815usb			
0000	0100	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na					
0000	0100	Finland, Scandv Weekend Radio	5980va	11720va			
0000	0100	Finland, YLE/Radio Finland	11990na	13730na			
0000	0100	Guatemala, Radio Cultural	3300do	5955do			
0000	0100	Guyana, Voice of	3290do	5950do			
0000	0100	Japan, Radio 6145na					
0000	0100	Malaysia, Radio	7295do				
0000	0100	Namibia, NBC	3270do	3290al			
0000	0100	Netherlands, Radio	6165na	9845as			
0000	0100	New Zealand, Radio NZ Intl	17675pa				
0000	0100	Russia, University Network	9940as				
0000	0100	Singapore, SBC Radio One	6150do				
0000	0100	Spain, R Exterior Espana 6055na					
0000	0100	UAE, AWR	6025as	6055as			
0000	0100	UK, BBC World Service	5875as	5970am	6195va	9825eu	1765me
		11955as 15360eu	17790af				
0000	0100	Ukraine, R Ukraine Intl	5905as	7320as	12040as		
0000	0100	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	13362usb	
0000	0100	USA, KAJI Dallas TX	5755va				
0000	0100	USA, KTBN Salt Lk City UT	7510na				
0000	0100	USA, KWHR Naalehu HI	17510as				
0000	0100	USA, Voice of America	5995me	6130am	7405am	9455am	9775am
		11695am 13790am					
0000	0100	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0000	0100	USA, WEWN Birmingham AL	5825na	9355na	15745na		
0000	0100	USA, WHRA Greenbush ME	7580af				
0000	0100	USA, WHRI Noblesville IN	5745va	7315am			
0000	0100	USA, WINB Red Lion PA	12160am				
0000	0100	USA, WJCR Upton KY	13595am				
0000	0100	USA, WRMI Miami FL	9955am				
0000	0100	USA, WRMI Miami FL	7385na				
0000	0100	USA, WRNO New Orleans LA	7355am				
0000	0100	USA, WSHB Cypress Creek SC	9430am	15285sa			
0000	0100	USA, WTJC Newport NC	9370na				
0000	0100	USA, WWBS Macon GA	11900na				
0000	0100	USA, WWCN Nashville TN	3210na	5070na	7435na	13845na	
0000	0100	USA, WWRB Manchester TN	3270va	5085va	6890va	9320va	
0000	0100	USA, WYFR Okeechobee FL	6085ca	9505na			
0000	0100	Zambia, Christian Voice	4965af				
0005	0010	Croatia, Croatian Radio	9925sa				
0030	0100	Australia, Radio	9660pa	12080pa	15240as	15415as	15415as
		17580va 17750as	17775pa	21740va			
			21680as				
0030	0100	Australia, Radio Christian Voice					
0030	0100	Iran, VOIRI	6065am	6135na			
0030	0100	Lithuania, R Vilnius	11690na				
0030	0100	Solomon Islands, SIBC	5020do				
0030	0100	Sri Lanka, SLBC	4940do	6005as	9770as	15425as	
0030	0100	Thailand, Radio	15395na				
0030	0100	UK, BBC World Service	17615as				
0030	0100	USA, Voice of America	5995me	6015me	6105me	7215as	7265me
		9890as 11760as	15185as	15290as	17740as	17820as	
0030	0100	USA, Voice of America	5995me	6015me	7215as	7265me	9890as
		11760as 15185as	15290as	17740as	17820as		
0055	0100	Italy, RAI Intl	9675na	11800na			

0100 UTC - 9PM E / 8PM C / 6PM P

0100	0115	Italy, RAI Intl	9675na	11800na			
0100	0115	UK, BBC World Service	5875as	11765me			
0100	0125	Netherlands, Radio	6165na	9845na			
0100	0127	Czech Rep, Radio Prague Intl		6200na	7345na		
0100	0127	Vietnam, Voice of	6175na				
0100	0130	Austria, Radio Austria Intl		9870na	17860na		
0100	0130	Germany, Universal Life/Santec		9435as			

0100	0130	Hungary, Radio Budapest	9560na				
0100	0130	Iran, VOIRI	6065am	6135na			
0100	0130	Serbia & Montenegro, R Yugo	7115am				
0100	0130	Slovakia, R Slovakia Intl	9530na	6190ca	9440sa		
0100	0130	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
		13790am					
0100	0130	Uzbekistan, Radio Tashkent	5955as	5975as	7215as		
0100	0145	Germany, Deutsche Welle	6040na	9640am	11810na	13720am	
0100	0156	China, China Radio Intl	9580na				
0100	0156	North Korea, Voice of	6195as	6520am	7140as	7580am	9345as
		11735am					
0100	0159	Canada, Radio Canada Intl	5960am	13670am	15170am	15305am	
0100	0200	Anguilla, Caribbean Beacon	6090am				
0100	0200	Australia, ABC NT Katherine	5025do				
0100	0200	Australia, ABC NT Tennant Crk	4910do				
0100	0200	Australia, Radio	9660pa	12080pa	15240as	15415as	17580va
		17750as 17775pa	21725as				
0100	0200	Australia, Radio Christian Voice	17775as	21680pa			
0100	0200	Canada, CBC Northern Service	9625do				
0100	0200	Canada, CFRX Toronto ON	6070do				
0100	0200	Canada, CFVP Calgary AB	6030do				
0100	0200	Canada, CKZN St John's NF	6160do				
0100	0200	Canada, CKZU Vancouver BC	6160do				
0100	0200	Costa Rica, R for Peace Intl	7455va	15040va	21815usb		
0100	0200	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na					
0100	0200	Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200	Ecuador, HCJB	9745na	11960na	21455usb		
0100	0200	Finland, Scandv Weekend Radio	5980va	11720va			
0100	0200	Guatemala, Radio Cultural	3300do	5955do			
0100	0200	Guyana, Voice of	3290do	5950do			
0100	0200	Indonesia, Voice of	9525pa	11785al	15150as		
0100	0200	Japan, Radio 11860pa	11870as	11880va	17810as	15325as	17685pa
		17835as 17845as					
0100	0200	Malaysia, Radio	7295do				
0100	0200	Namibia, NBC	3270do	3290al			
0100	0200	New Zealand, Radio NZ Intl	17675pa				
0100	0200	Russia, University Network	9940as				
0100	0200	Russia, Voice of Russia	7180na	9765na	12020na	13665na	
0100	0200	Singapore, SBC Radio One	6150do				
0100	0200	Solomon Islands, SIBC	5020do				
0100	0200	Spain, R Exterior Espana 6055na					
0100	0200	Sri Lanka, SLBC	6005as	9770as	15425as		
0100	0200	UK, BBC World Service	5975am	6195as	9825eu	11955as	15360eu
		17615as 17790af					
0100	0200	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	13362usb	
0100	0200	USA, KAJI Dallas TX	5755va				
0100	0200	USA, KTBN Salt Lk City UT	7510na				
0100	0200	USA, KVOH Rancho Simi CA	9975na				
0100	0200	USA, KWHR Naalehu HI	17510as				
0100	0200	USA, Voice of America	5995me	6015me	6105me	7115as	7200as
		7255me 9850as	11705as	11820as	15250as	15300as	17740as
		17820as					
0100	0200	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0100	0200	USA, WEWN Birmingham AL	5825na	9355na	15745na		
0100	0200	USA, WHRA Greenbush ME	7580af				
0100	0200	USA, WHRI Noblesville IN	5745va	7315am			
0100	0200	USA, WINB Red Lion PA	12160am				
0100	0200	USA, WJCR Upton KY	13595am				
0100	0200	USA, WRMI Miami FL	9955am				
0100	0200	USA, WRMI Miami FL	7385na				
0100	0200	USA, WRNO New Orleans LA	7355am				
0100	0200	USA, WSHB Cypress Creek SC	9430na	15285sa			
0100	0200	USA, WTJC Newport NC	9370na				
0100	0200	USA, WWCN Nashville TN	3210na	5070na	5935na	7435na	
0100	0200	USA, WWRB Manchester TN	5085va	6890va			
0100	0200	USA, WYFR Okeechobee FL	6065na	9505na			
0100	0200	Zambia, Christian Voice	4965af				
0130	0145	Libya, Voice of Africa	15435irr	17750irr			
0130	0200	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
0130	0200	Sweden, Radio	13625va				
0130	0200	UK, RTE Radio	6155na				
0130	0200	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
		13740am					
0140	0145	Croatia, Croatian Radio	9925sa				
0140	0200	Vatican City, Vatican Radio	7335au	9650au			
0145	0200	Albania, Radio Tirana Intl	6115na	7160na			

0200 UTC - 10PM E / 9PM C / 7PM P

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na			
0200	0230	Belarus, Radio Belarus Intl	6070eu	7210eu			
0200	0230	Myanmar, Radio	7185do				
0200	0230	Serbia & Montenegro, R Yugo	7130am				
0200	0230	Solomon Islands, SIBC	5020do				
0200	0230	UK, BBC World Service	9510eu	9820am			
0200	0230	UK, BBC World Service	11845af				
0200	0230	UK, Wales Radio Intl	9795na				
0200	0245	Germany, Deutsche Welle	11965as	13720as	15370as		
0200	0256	North Korea, Voice of	9325as	11335as			
0200	0257	Canada, Radio Canada Intl	15260as	17860as			
0200	0300	Anguilla, Caribbean Beacon	6090am				

SELECTED PROGRAMMING BEGINS ON PAGE 55

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0200	0300	twhfa	Argentina, RAE	6060am	11710am			
0200	0300		Australia, ABC NT Alice Springs	4835do				
0200	0300		Australia, ABC NT Katherine	5025do				
0200	0300		Australia, ABC NT Tennant Crk	4910do				
0200	0300		Australia, Radio	9660pa	12080pa	15420as	15415as	15515va
			17580va 17750as 21725as					
0200	0300		Australia, Radio Christian Voice		17775as	21680pa		
0200	0300	vl	Austria, AWR Europe	9820as				
0200	0300		Bulgaria, Radio	7400na	9400na			
0200	0300		Canada, CBC Northern Service	9625do				
0200	0300		Canada, CFRX Toronto ON	6070do				
0200	0300		Canada, CFPV Calgary AB	6030do				
0200	0300		Canada, CKZN St John's NF	6160do				
0200	0300		Canada, CKZU Vancouver BC	6160do				
0200	0300		Costa Rica, R for Peace Intl	7455va	15040va			
0200	0300		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 13749na					
0200	0300		Cuba, Radio Havana	6000na	9820na	11705usb		
0200	0300		Ecuador, HCJB	9745na	11960na	21455usb	21470as	
0200	0300		Egypt, Radio Cairo	9475na				
0200	0300	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
0200	0300	m/vl	Guatemala, Radio Cultural		3300do	5955do		
0200	0300		Guyana, Voice of	3290do				
0200	0300		Kenya, Kenya BC Corp	4885do				
0200	0300		Malaysia, Radio	7295do				
0200	0300		Namibia, NBC	3270do	3290al			
0200	0300		New Zealand, Radio NZ Intl		17675pa			
0200	0300		Philippines, Radio Pilipinas		12015as	15120as	15270as	
0200	0300		Romania, R Romania Intl		9550na	11740na	11830na	11940va
			15290as 15370pa					
0200	0300		Russia, University Network		9940as			
0200	0300		Russia, Voice of Russia	7180na	7250na	7335na	12020na	13665na
0200	0300		Singapore, SBC Radio One		6150do			
0200	0300	mtwhf/vl	Solomon Islands, SIBC	5020do				
0200	0300		South Korea, R Korea Intl		7275na	9560na	11725sa	11810sa
			15575na					
0200	0300		Sri Lanka, SLBC	6005as	6130do	9770as	15425as	
0200	0300		Taiwan, R Taipei Intl	15320na	15465na			
0200	0300		Taiwan, R Taipei Intl	5950na	9680na	11740ca	15320as	15345as
0200	0300		UK, BBC World Service	5975am	6195as	9410va	9825eu	11955as
			12095sa 15360eu 15470af		17790af			
0200	0300		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb 10940usb	12579usb				
0200	0300		USA, KAJI Dallas TX	5755va				
0200	0300		USA, KJES Vado NM	7555na				
0200	0300		USA, KTBN Salt Lk City UT		7510na			
0200	0300		USA, KVOH Rancho Simi CA		9975na			
0200	0300		USA, KWHR Naalehu HI	117510as				
0200	0300		USA, Voice of America	5995me	6015me	6105me	7115as	7200as
			7255me 9850as 11705as	11820as	15250as	15300as		17740as
			17820as					
0200	0300		USA, WBCQ Kennebunk, ME		7415na	9335na	11660na	
0200	0300		USA, WEWN Birmingham AL		5825na	9355na	15745na	
0200	0300		USA, WHRA Greenbush ME		7580af			
0200	0300		USA, WHRI Noblesville IN		5745va	7315am		
0200	0300		USA, WINB Red Lion PA	12160am				
0200	0300		USA, WJCR Upton KY	13595am				
0200	0300	s m	USA, WRMI Miami FL	9955am				
0200	0300	twhfa	USA, WRMI Miami FL	7385na				
0200	0300		USA, WRNO New Orleans LA		7355am			
0200	0300		USA, WSHB Cypress Creek SC		7535am	9430na		
0200	0300		USA, WTJC Newport NC		9370na			
0200	0300		USA, WWCN Nashville TN		3210na	5070na	5935na	7435na
0200	0300		USA, WWRB Manchester TN		5085va	6890va		
0200	0300		USA, WYFR Okeechobee FL		6065na	9505na		
0200	0300		Zambia, Christian Voice	4965af				
0200	1215		Cambodia, National Radio Of		11940as			
0205	0210		Croatia, Croatian Radio	9925na				
0215	0220		Nepal, Radio 3230as	5005as				
0230	0257		Vietnam, Voice of	6175na				
0230	0300		Albania, Radio Tirana Intl		6115eu	7160eu		
0230	0300		Hungary, Radio Budapest		9570na			
0230	0300		Slovakia, AWR	7235as				
0230	0300		Sweden, Radio	9490na				
0230	0300		UK, BBC World Service	15405af	17655eu			
0230	0300	mtwhfa	UK, BBC World Service	7130af	9585as			
0230	0300	vl	Zambia, Radio ZNBC	4910do	6265al			
0245	0300	as	Myanmar, Radio	7185do				
0250	0300		Vatican City, Vatican Radio		7305am	9605am		

0300 UTC - 11PM E / 10PM C / 8PM P

0300	0305		India, All India Radio	4970as	4990as	5050as	7150as	
0300	0310		Vatican City, Vatican Radio		7305am	9605am		
0300	0330		Ecuador, HCJB	11960na	21470as			
0300	0330		Egypt, Radio Cairo	9475na				
0300	0330	s twhfa	Mexico, Radio Mexico Intl		9705am	11770am		
0300	0330		Philippines, Radio Pilipinas		12015as	15120as	15270as	
0300	0330		S Africa, Channel Africa	9525af				
0300	0330		Thailand, Radio	15395na				
0300	0330		UK, BBC World Service	9610af	15360eu			
0300	0330	mtwhfa	UK, BBC World Service	7130af	9585as			
0300	0330		USA, KJES Vado NM	7555na				
0300	0330		USA, KVOH Rancho Simi CA		9975na			
0300	0330	mtwhf	USA, Voice of America	4960af				
0300	0345		Germany, Deutsche Welle		9535na	9640na	11935am	15105na

0300	0345		UK, BBC World Service	9515as				
0300	0356		China, China Radio Intl	9690na				
0300	0356		North Korea, Voice of	6195as	7140as	9345as		
0300	0400		Anguilla, Caribbean Beacon		6090am			
0300	0400		Australia, ABC NT Alice Springs		4835do			
0300	0400		Australia, ABC NT Katherine		5025do			
0300	0400		Australia, ABC NT Tennant Crk		4910do			
0300	0400		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
			17580va 17750as 21725as					
0300	0400		Australia, Radio Christian Voice		17775as	21680pa		
0300	0400	vl	Botswana, Radio	3356do	4820do	7255do		
0300	0400		Canada, CBC Northern Service		9625do			
0300	0400		Canada, CFRX Toronto ON		6070do			
0300	0400		Canada, CFPV Calgary AB		6030do			
0300	0400		Canada, CKZN St John's NF		6160do			
0300	0400		Canada, CKZU Vancouver BC		6160do			
0300	0400		Costa Rica, R for Peace Intl		7455va	15040va		
0300	0400		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na 17645as					
0300	0400		Cuba, Radio Havana	6000na	9820na	11705usb		
0300	0400		Ecuador, HCJB		9745na	21455usb		
0300	0400	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
0300	0400	vl	Guatemala, Radio Cultural		3300do	5955do		
0300	0400		Guyana, Voice of	3290do				
0300	0400		Japan, Radio 17825ca					
0300	0400		Kenya, Kenya BC Corp	4885do				
0300	0400		Malaysia, Radio	7295do				
0300	0400		Namibia, NBC	3270do	3290al			
0300	0400		New Zealand, Radio NZ Intl		17675pa			
0300	0400		Oman, Radio	15355va				
0300	0400		Russia, University Network		17765as			
0300	0400		Russia, Voice of Russia	7125na	7180na	7330na	12010na	12020na
			13665na 15595na 17595na					
0300	0400		Singapore, SBC Radio One		6150do			
0300	0400	mtwhf/vl	Solomon Islands, SIBC	5020do				
0300	0400		Sri Lanka, SLBC	6005as	9770as	15425as		
0300	0400		Taiwan, R Taipei Intl	5950na	9680na	11875as	15320as	
0300	0400		Turkey, Voice of	7270va	9650va	11655va		
0300	0400	vl	UAE, AWR	11775as				
0300	0400		Uganda, Radio	4976do	5026al	7195al		
0300	0400		UK, BBC World Service	3255af	5975am	6195eu	9410eu	11730as
			11835am 12095sa 15310as		15575va			
0300	0400		Ukraine, R Ukraine Intl	7150as	12040as			
0300	0400		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb 10940usb	12579usb				
0300	0400		USA, KAJI Dallas TX	5755va				
0300	0400		USA, KTBN Salt Lk City UT		7510na			
0300	0400		USA, KWHR Naalehu HI	117510as				
0300	0400		USA, Voice of America	6035af	6080af	7105af	7290af	7340af
			7415af 9575af 9885af					
0300	0400		USA, WBCQ Kennebunk, ME		7415na	9335na	11660na	
0300	0400		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0300	0400		USA, WHRA Greenbush ME		7580af			
0300	0400		USA, WHRI Noblesville IN		5745va	7315am		
0300	0400		USA, WINB Red Lion PA	12160am				
0300	0400		USA, WJCR Upton KY	13595am				
0300	0400		USA, WMLK Bethel PA	9465eu				
0300	0400	twhfa	USA, WRMI Miami FL	7385na				
0300	0400		USA, WRNO New Orleans LA		7395am			
0300	0400		USA, WSHB Cypress Creek SC		7535eu	11550eu		
0300	0400		USA, WTJC Newport NC		9370na			
0300	0400		USA, WWCN Nashville TN		3210na	5070na	5935na	7435na
0300	0400		USA, WWRB Manchester TN		5085va	6890va		
0300	0400		USA, WYFR Okeechobee FL		6065na	9505na		
0300	0400		Zambia, Christian Voice	6065af				
0300	0400	vl	Zambia, Radio ZNBC	4910do	6265al			
0310	0340		Vatican City, Vatican Radio		9660af			
0330	0345	vl	Libya, Voice of Africa	15435irr	17750irr			
0330	0350		UAE, Emirates Radio	12005na	13675na	15395na	15435na	
0330	0357		Vietnam, Voice of	6175na				
0330	0400		Ecuador, HCJB		11960na			
0330	0400		Malaysia, RTM Kota Kinabalu		5979do			
0330	0400		Nigeria, Radio/Kaduna	4770do				
0330	0400		Nigeria, Radio/Lagos	3326do	4990al			
0330	0400		Sweden, Radio	9490na				
0340	0345		Croatia, Croatian Radio		9925na			
0345	0400	f	Seychelles, FEBA Radio	11885af				
0345	0400		Tajikistan, Radio	7245as				

0400 UTC -

Shortwave Guide



0400	0458	New Zealand, Radio NZ Intl	17675pa				
0400	0500	Anguilla, Caribbean Beacon	6090am				
0400	0500	Australia, ABC NT Alice Springs	4835do				
0400	0500	Australia, ABC NT Katherine	5025do				
0400	0500	Australia, ABC NT Tennant Crk	4910do				
0400	0500	Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
		17580va 17750as	21725as				
0400	0500	Botswana, Radio	3356do	4820do	7255do		
0400	0500	Cameroon, RTV	4850do				
0400	0500	Canada, CBC Northern Service	9625do				
0400	0500	Canada, CFRX Toronto ON	6070do				
0400	0500	Canada, CKZN St John's NF	6160do				
0400	0500	Canada, CKZU Vancouver BC	6160do				
0400	0500	Costa Rica, R for Peace Intl	7455va	15040va			
0400	0500	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na	17645as				
0400	0500	Cuba, Radio Havana	6000na	9820na	11705usb		
0400	0500	Ecuador, HCJB	9745na	11960na	21455usb		
0400	0500	Finland, Scandv Weekend Radio	5990va	11720va			
0400	0500	Guyana, Voice of	3290do	5950do			
0400	0500	Kenya, Kenya BC Corp	4885do				
0400	0500	Malaysia, Radio	7295do				
0400	0500	Malaysia, RTM Kota Kinabalu	5979do				
0400	0500	Malaysia, Voice of	6175as				
0400	0500	Namibia, NBC	3270do	3290al			
0400	0500	Nigeria, Radio/Kaduna	4770do	6090do			
0400	0500	Nigeria, Radio/Lagos	3326do	4990al			
0400	0500	Nigeria, Voice of	7255af				
0400	0500	Romania, R Romania Intl	9550na	11830na	15335as	17735as	
0400	0500	Russia, University Network	17765as				
0400	0500	Russia, Voice of Russia	7125na	7180na	7330na	12010na	12020na
		15595na 17595na					
0400	0500	Singapore, SBC Radio One	6150do				
0400	0500	Solomon Islands, SIBC	5020do				
0400	0500	Uganda, Radio	4976do	5026al	7195al		
0400	0500	UK, BBC World Service	3255af	5975va	6005af		
		6195eu 7120af 9410eu		11835am	12095va 15310as	15575va	
		17640as 17790as					
0400	0500	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
0400	0500	USA, KAJI Dallas TX	5755va				
0400	0500	USA, KBTN Salt Lk City UT		7510na			
0400	0500	USA, KWHR Naalehu HI 17780as					
0400	0500	USA, Voice of America	6080af	7170af	7290af	7415af	9575af
		9775af 9885af	15205as				
0400	0500	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0400	0500	USA, WEWN Birmingham AL	5825na	7425na	15745na		
0400	0500	USA, WHRA Greenbush ME	7580af				
0400	0500	USA, WHRI Noblesville IN	5745va	7315am			
0400	0500	USA, WINB Red Lion PA 12160am					
0400	0500	USA, WJCR Upton KY	13595am				
0400	0500	USA, WMLK Bethel PA	9465eu				
0400	0500	USA, WRMI Miami FL	7385na				
0400	0500	USA, WSHB Cypress Creek SC	7535eu	15195af			
0400	0500	USA, WTJC Newport NC	9370na				
0400	0500	USA, WWCN Nashville TN	3210na	5935na	7560na		
0400	0500	USA, WWRB Manchester TN	5085va	6890va			
0400	0500	USA, WYFR Okeechobee FL	9355eu	11580va			
0400	0500	Zambia, Christian Voice	6065af				
0400	0500	Zambia, Radio ZNBC	4910do	6265al			
0405	0410	Croatia, Croatian Radio	7285na	9925na			
0427	0500	Liberia, Voice of Hope	12060af	15320af			
0430	0457	Czech Rep, Radio Prague Intl		9865va	11600va		
0430	0500	Australia, Radio Christian Voice		21680as			
0430	0500	Italy, IRRS	3980al	3985va			
0430	0500	Netherlands, Radio	6165na	9590na			
0430	0500	Nigeria, Radio/Enugu	6025do				
0430	0500	Nigeria, Radio/Ibadan	6050do				
0430	0500	S Africa, AWR Africa	12080af				
0430	0500	Swaziland, TWR	4775af	6035af			
0430	0500	UK, BBC World Service	3390af				
0445	0500	Italy, RAI Intl	5965af	7235af			
0459	0500	New Zealand, Radio NZ Intl		11820pa			

0500 UTC - 1AM E / 12AM C / 10PM P

0500	0515	Canada, CBC Northern Service	9625do				
0500	0520	Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
0500	0525	Liberia, Voice of Hope	12060af				
0500	0530	France Radio France Intl	13610af	15155af			
0500	0530	Netherlands, Radio	6165na	9590na			
0500	0530	S Africa, AWR Africa	5960af	6015af			
0500	0530	S Africa, Channel Africa	15215af				
0500	0530	Uganda, Radio	4976do	5026al	7195al		
0500	0530	Vatican City, Vatican Radio	9660af	11625af	15570af		
0500	0545	Germany, Deutsche Welle	9670na	9785na	11985na		
0500	0556	Spain, R Exterior Espana	6055na				
0500	0600	Anguilla, Caribbean Beacon	6090am				
0500	0600	Australia, ABC NT Alice Springs	4835do				
0500	0600	Australia, ABC NT Katherine	5025do				
0500	0600	Australia, ABC NT Tennant Crk	4910do				
0500	0600	Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
		17580va 17750as	21725as				
0500	0600	Bhutan, Bhutan BC Service	5030al	6035do			
0500	0600	Botswana, Radio	3356do	4820do	7255do		
0500	0600	Cameroon, RTV	4850do				

0500	0600	Canada, CFRX Toronto ON	6070do				
0500	0600	Canada, CKZN St John's NF	6160do				
0500	0600	Canada, CKZU Vancouver BC	6160do				
0500	0600	Costa Rica, R for Peace Intl	7455va	15040va			
0500	0600	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na	17645as				
0500	0600	Cuba, Radio Havana	9550am	9820na	9830usb		
0500	0600	Ecuador, HCJB	9745na	11960na	21455usb		
0500	0600	Finland, Scandv Weekend Radio	5990va	11720va			
0500	0600	Guyana, Voice of	3290do	5950do			
0500	0600	Japan, Radio 5975eu	6110na	7230eu	9835na 11715eu	11760eu	
		15195as 17810as 21755pa					
0500	0600	Kenya, Kenya BC Corp	4885do				
0500	0600	Kuwait, Radio	15110as				
0500	0600	Liberia, R Liberia Intl	6100do				
0500	0600	Malaysia, Radio	7295do				
0500	0600	Malaysia, RTM Kota Kinabalu	5979do				
0500	0600	Malaysia, Voice of	6175as		15295as		
0500	0600	Namibia, NBC	3270do	3290al			
0500	0600	New Zealand, Radio NZ Intl		11820pa			
0500	0600	Nigeria, Radio/Enugu	6025do				
0500	0600	Nigeria, Radio/Ibadan	6050do				
0500	0600	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
0500	0600	Nigeria, Radio/Lagos	3326do	4990al			
0500	0600	Nigeria, Voice of	7255af				
0500	0600	Russia, University Network	17765as				
0500	0600	Russia, Voice of Russia	11770au	12010au	15275au 15470au	17655au	
		17665au 21485au	21790au				
0500	0600	Singapore, SBC Radio One	6150do				
0500	0600	Solomon Islands, SIBC	5020do				
0500	0600	Swaziland, TWR	6035af	7205af	9500af		
0500	0600	UK, BBC World Service	6005af	6190af	6195eu	9410eu 11760me	
		11955as 12095eu 15310as		15360as	17640as	17790as	
0500	0600	UK, BBC World Service	15575me				
0500	0600	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
0500	0600	USA, KAJI Dallas TX	5755va				
0500	0600	USA, KBTN Salt Lk City UT		7510na			
0500	0600	USA, KWHR Naalehu HI 17780as					
0500	0600	USA, KWHR Naalehu HI 11565pa					
0500	0600	USA, Voice of America	5970af	6035af	6080af	7170af	7295af
		9700af 11825eu	11835af	13710af 15205as			
0500	0600	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
0500	0600	USA, WEWN Birmingham AL	5825na	7425na	15745na		
0500	0600	USA, WHRA Greenbush ME	7580af				
0500	0600	USA, WHRI Noblesville IN	5745va	7315am			
0500	0600	USA, WJCR Upton KY	13595am				
0500	0600	USA, WMLK Bethel PA	9465eu				
0500	0600	USA, WRMI Miami FL	7385na				
0500	0600	USA, WRNO New Orleans LA	7395am				
0500	0600	USA, WSHB Cypress Creek SC	7535eu	9840af			
0500	0600	USA, WTJC Newport NC	9370na				
0500	0600	USA, WWCN Nashville TN	3210na	5070na	5935na	7560na	
0500	0600	USA, WWRB Manchester TN	5825na				
0500	0600	USA, WYFR Okeechobee FL	9355eu				
0525	0600	Zambia, Christian Voice	6065af				
0530	0550	Ghana, Ghana BC Corp	3366do	4915do			
0530	0550	UAE, Emirates Radio	15435au	17830au	21695au		
0530	0600	Australia, Radio Christian Voice		21680as			
0530	0600	S Africa, AWR Africa	15345af				
0530	0600	Thailand, Radio	21795eu				
0530	0600	UK, BBC World Service	9885eu	17885af	21660as		
0532	0600	Austria, Radio Austria Intl	6155va	13730va			
0540	0545	Croatia, Croatian Radio	7285na	9925na			

0600 UTC - 2AM E / 1AM C / 11PM P

0600	0615		UK, BBC World Service	15325me					
0600	0630	mtwhf	France Radio France Intl	11710af	15155af				
0600	0630		Namibia, NBC	3270do	3290af				
0600	0630		S Africa, AWR Africa	15345af					
0600	0630		S Africa, Channel Africa	15215af					
0600	0630		USA, Voice of America	5970af	6035af	6080af	7170af	7295af	
			11825eu 11825af 11915me	11930af	11995af	12025af	13710af		
			15205as 15335me						
0600	0630	vl	Zimbabwe, ZBC Corp	5975do					
0600	0645		Germany, Deutsche Welle		11925af	13790af	17860af		
0600	0650	vl	Greece, Voice of	9420eu	15630eu				
0600	0700		Anguilla, Caribbean Beacon	6090am					
0600	0700		Australia, ABC NT Alice Springs	4835do					
0600	0700		Australia, ABC NT Katherine	5025do					
0600	0700		Australia, ABC NT Tennant Crk	4910do					
0600	0700		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va	
			17580va 17750as	21725as					
0600	0700		Australia, Radio Christian Voice		21680as				
0600	0700	vl	Botswana, Radio	4820do	7255do				
0600	0700	irrg/vl	Cameroon, RTV	4850do					
0600	0700		Canada, CFRX Toronto ON	6070do					
0600	0700		Canada, CFVP Calgary AB	6030do					
0600	0700		Canada, CKZN St John's NF	6160do					
0600	0700		Canada, CKZU Vancouver BC	6160do					
0600	0700		Costa Rica, R for Peace Intl	7455va					
0600	0700		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na	17645as					
0600	0700		Cuba, Radio Havana	9550am	9820na	9830usb			
0600	0700		Ecuador, HCJB	11680eu					

Shortwave Guide



0600	0700	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va				
0600	0700		Germany, Deutsche Welle	6140eu					
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do				
0600	0700		Guyana, Voice of	3290do					
0600	0700	mtwhf/vl	Italy, IRRS 3980a	3985va					
0600	0700		Japan, Radio 7230eu	9835na	11740as	15195as	17870pa	21755pa	
0600	0700		Kenya, Kenya BC Corp	4885do					
0600	0700		Kuwait, Radio	15110as					
0600	0700	irreg	Liberia, ELWA	4760do					
0600	0700		Liberia, R Liberia Intl	6100do					
0600	0700		Malaysia, Radio	7295do					
0600	0700		Malaysia, Voice of	6175as	9750as	15295as			
0600	0700		New Zealand, Radio NZ Intl	11820pa					
0600	0700		Nigeria, Radio/Enugu	6025do					
0600	0700		Nigeria, Radio/Ibadan	6050do					
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
0600	0700		Nigeria, Radio/Lagos	3326do	4990al				
0600	0700		Nigeria, Voice of	7255af					
0600	0700		Romania, R Romania Intl	9530na	11830na	17720na			
0600	0700		Russia, University Network	17765as					
0600	0700		Russia, Voice of Russia	11770au	12010au	15275au	15470au		
0600	0700		17655au 17665au	21485au	21790au				
0600	0700		Sierra Leone, SLBS	3316do					
0600	0700		Singapore, SBC Radio One	6150do					
0600	0700	vl	Solomon Islands, SIBC	5020do					
0600	0700		Swaziland, TWR	6035af	7205af	9500af			
0600	0700		UK, BBC World Service	6055af	6190af	9410eu	11955as	12095eu	
0600	0700		15310as 15360as	17640as	17790as	21660as			
0600	0700	mtwhf	UK, BBC World Service	15575me					
0600	0700		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
0600	0700		6458usb 10320usb	10940usb	12579usb	13362usb			
0600	0700		USA, KAJI Dallas TX	5755va					
0600	0700		USA, KTNB Salt Lk City UT	7510na					
0600	0700		USA, KWHR Naalehu HI	11780as					
0600	0700	mtwhf	USA, KWHR Naalehu HI	11565pa					
0600	0700		USA, WBCQ Kennebunk, ME	7415na					
0600	0700		USA, WEWN Birmingham AL	5825na	7425na	15745na			
0600	0700		USA, WHRA Greenbush ME	7580af					
0600	0700		USA, WHRI Noblesville IN	5745va	7315am				
0600	0700		USA, WJCR Upton KY	13595am					
0600	0700		USA, WMLK Bethel PA	9465eu					
0600	0700	twhta	USA, WRMI Miami FL	7385na					
0600	0700		USA, WRNO New Orleans LA	7395am					
0600	0700		USA, WSHB Cypress Creek SC	9450af					
0600	0700		USA, WTJC Newport NC	9370na					
0600	0700		USA, WWCN Nashville TN	3210na	5070na	5935na	7560na		
0600	0700		USA, WWRB Manchester TN	6890va					
0600	0700		USA, WYFR Okeechobee FL	7355eu	11580va				
0600	0700	vl	Vanuatu, Radio	7260do					
0600	0700		Yemen, Rep of Yemen Radio	9780me					
0600	0700		Zambia, Christian Voice	9865af					
0600	0700	vl	Zambia, Radio ZNBC	4910do	6265al				
0605	0610		Croatia, Croatian Radio	9470pa					
0610	0615	mtwhf	Vatican City, Vatican Radio	9645eu	11740eu	15595va			
0630	0700		Ecuador, HCJB	21455usb					
0630	0700		Georgia, Georgian Radio	11805eu					
0630	0700		USA, Voice of America	5995af	7170af	11815eu	11915me	11930af	
0630	0700	as	12025af 15205as	15335me					
0630	0700		USA, Voice of America	5970af	6035af	6080af	7295af		
0636	0653		11835af 1995af	13710af					
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af			
0636	0653		Romania, R Romania Intl	7145eu	9510eu	9570eu	11790eu		
0645	0655	a	Monaco, TWR	9870eu					
0645	0700	as	Germany, TWR	6045eu					
0655	0700	mtwhf	Germany, TWR	6045eu					
0655	0700	mtwhf	Monaco, TWR	9870eu					

0700 UTC - 3AM E / 2AM C / 12AM P

0700	0705		New Zealand, Radio NZ Intl	11820pa					
0700	0720		UK, BBC World Service	6005af					
0700	0725		Belgium, RVI Flanders R Intl	5985eu					
0700	0730		Slovakia, R Slovakia Intl	9440va	15460va	17550va			
0700	0730		USA, Voice of America	11915me	12025af	15335me			
0700	0730	a	USA, Voice of America	6873af					
0700	0745		USA, WYFR Okeechobee FL	7355eu	13695va				
0700	0750	a	Germany, TWR	6045eu					
0700	0800		Anguilla, Caribbean Beacon	6090am					
0700	0800		Australia, ABC NT Alice Springs	4835do					
0700	0800		Australia, ABC NT Katherine	5025do					
0700	0800		Australia, ABC NT Tennant Crk	4910do					
0700	0800		Australia, Radio	9660pa	15240va	15415as	17580va		
0700	0800		17750as 21725as						
0700	0800		Australia, Radio Christian Voice	17820as	21680pa				
0700	0800	vl	Austria, AWR Europe	7230eu					
0700	0800	vl	Botswana, Radio	4820do	7255do				
0700	0800	irrg/vl	Cameroon, RTV	4850do					
0700	0800		Canada, CFRX Toronto ON	6070do					
0700	0800		Canada, CFVP Calgary AB	6030do					
0700	0800		Canada, CKZN St John's NF	6160do					
0700	0800		Canada, CKZU Vancouver BC	6160do					
0700	0800		Costa Rica, R for Peace Intl	7455va					
0700	0800		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
0700	0800		11870am 13750na	17645as					

0700	0800		Ecuador, HCJB	11680eu	11755pa	21455usb			
0700	0800	mtwhf	Eqt Guinea, Radio Africa	15185af					
0700	0800	as/vl	Eqt. Guinea, Radio East Africa	15185af					
0700	0800	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va				
0700	0800	mtwhf	France Radio France Intl	15605af					
0700	0800		Germany, Deutsche Welle	6140eu					
0700	0800	s	Germany, TWR	6045eu					
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do				
0700	0800	vl	Greece, Voice of	15630eu					
0700	0800		Guyana, Voice of	3290do					
0700	0800	as/vl	Italy, IRRS 7120va	7125al					
0700	0800		Kenya, Kenya BC Corp	4885do					
0700	0800		Kuwait, Radio	15110as					
0700	0800	irreg	Liberia, ELWA	4760do					
0700	0800		Liberia, R Liberia Intl	6100do					
0700	0800		Malaysia, Radio	7295do					
0700	0800		Malaysia, RTM Kota Kinabalu	5979do					
0700	0800		Malaysia, Voice of	6175as	15295as				
0700	0800	vl/s	Malta, VO Mediterranean	9605eu					
0700	0800	mtwhfa	Monaco, TWR	9870eu					
0700	0800		Myanmar, Radio	9730do					
0700	0800		Nigeria, Radio/Enugu	6025do					
0700	0800		Nigeria, Radio/Ibadan	6050do					
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
0700	0800		Nigeria, Radio/Lagos	3326do					
0700	0800		Palau, KHBV/VO Hope	9965as	9985as	15725as			
0700	0800		Papua New Guinea, NBC	4890do	9675al				
0700	0800		Romania, R Romania Intl	15335af	17730af				
0700	0800		Russia, University Network	17765as					
0700	0800		Russia, Voice of Russia	11770au	12010au	15275au	15470au		
0700	0800		17495au 17525au	17590au	17655au	17665au	21485au		
0700	0800		Sierra Leone, SLBS	3316do					
0700	0800		Singapore, SBC Radio One	6150do					
0700	0800	vl	Solomon Islands, SIBC	5020do					
0700	0800		Swaziland, TWR	6035af	7205af	9500af			
0700	0800		Taiwan, R Taipei Intl	5950na					
0700	0800		UK, BBC World Service	6190af	11760me	11765af	11955as	12095eu	
0700	0800		15310as 15360as	15576as	17640af	17790as	17885af	21660as	
0700	0800	f	UK, BBC World Service	12035af	15420af				
0700	0800		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
0700	0800		6458usb 10320usb	10940usb	12579usb	13362usb			
0700	0800		USA, KAJI Dallas TX	5755va					
0700	0800		USA, KTNB Salt Lk City UT	7510na					
0700	0800		USA, KWHR Naalehu HI	11565pa					
0700	0800		USA, WBCQ Kennebunk, ME	7415na					
0700	0800		USA, WEWN Birmingham AL	5825na	7425na	15745na			
0700	0800		USA, WHRA Greenbush ME	7580af					
0700	0800		USA, WHRI Noblesville IN	5745va	7315am				
0700	0800		USA, WJCR Upton KY	13595am					
0700	0800		USA, WMLK Bethel PA	9465eu					
0700	0800		USA, WRNO New Orleans LA	7395am					
0700	0800		USA, WSHB Cypress Creek SC	9450af					
0700	0800		USA, WTJC Newport NC	9370na					
0700	0800		USA, WWCN Nashville TN	3210na	5070na	5935na	7560na		
0700	0800		USA, WWRB Manchester TN	6890va					
0700	0800		USA, WYFR Okeechobee FL	15170af					
0700	0800	vl	Vanuatu, Radio	4960do	7260do				
0700	0800		Zambia, Christian Voice	9865af					
0700	0800	vl	Zambia, Radio ZNBC	4910do	6265al				
0706	0800		New Zealand, Radio NZ Intl	9885pa					
0715	0800		Guam, TWR 15215as						
0720	0735	mtwhf	Swaziland, TWR	6035af	7205af	9500af			
0730	0800	t h	Georgia, Georgian Radio	6080me					
0730	0800		Switzerland, Swiss R Intl	15445af	17685af	21750af			
0740	0745		Croatia, Croatian Radio	9470pa					

0800 UTC - 4AM E / 3AM C / 1AM P

0800	0804		Pakistan, Radio	17510eu	21465eu				
0800	0820	mtwhf	Germany, TWR	6045eu					
0800	0820	mtwhfa	Monaco, TWR	9870eu					
0800	0820		UK, BBC World Service	11680am	17790as				
0800	0827		Czech Rep, Radio Prague Intl	11600eu	15255eu				
0800	0830		Australia, ABC NT Alice Springs	4835do					
0800	0830		Australia, ABC NT Katherine	5025do					
0800	0830		Australia, ABC NT Tennant Crk	4910do					
0800	0830		Malaysia, RTM Kota Kinabalu	5979do					
0800	0830		Malaysia, Voice of	6175as	9750as	15295as			
0800	0830		Myanmar, Radio	9730do					
0800	0830		USA, Voice of America	11995as	13615as	15150as			
0800	0900		Anguilla, Caribbean Beacon	6090am					
0800	0900		Australia, Radio	9580va	9710as	12080pa	15240va	15415as	
			17580as 21725as						
0800	0900		Australia, Radio Christian Voice	17820as	21680pa				
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do				
0800	0900	vi	Botswana, Radio	4820do	7255do				
0800	0900	irr/vl	Cameroon, RTV	4850do					
0800	0900		Canada, CFRX Toronto ON	6070do					
0800	0900		Canada, CFVP Calgary AB	6030do					
0800	0900		Canada, CKZN St John's NF	6160do					
0800	0900		Canada, CKZU Vancouver BC	6160do					
0800	0900		Costa Rica, R for Peace Intl	7455va					
0800	0900		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na	17645as					
0800	0900		Ecuador, HCJB	11755pa	21455usb				
0800	0900	mtwhf	Eqt Guinea, Radio Africa	15185uf					

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0800	0900	as/vl	Eqt. Guinea, Radio East Africa	15185af					
0800	0900	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
0800	0900		Germany, Deutsche Welle	6140eu					
0800	0900	a	Germany, Remnants Hope Minstr	13810as					
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do				
0800	0900	vl	Greece, Voice of	15630eu	17905eu				
0800	0900		Guam, TWR 15215as						
0800	0900		Guyana, Voice of	3290do	5950do				
0800	0900		Indonesia, Voice of	9525pa	11785al	15150as			
0800	0900	as/vl	Italy, IRRS 7120va	7125al					
0800	0900		Kenya, Kenya BC Corp	4885do					
0800	0900	irreg	Liberia, ELWA	4760do					
0800	0900		Liberia, R Liberia Intl	6100do					
0800	0900		Malaysia, Radio	7295do					
0800	0900	vl/s	Malta, VO Mediterranean	9605eu					
0800	0900		New Zealand, Radio NZ Intl	9885pa					
0800	0900		Nigeria, Radio/Enugu	6025do					
0800	0900		Nigeria, Radio/Ibadan	6050do					
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
0800	0900		Nigeria, Radio/Lagos	3326do	4990al				
0800	0900		Nigeria, Voice of	7255af					
0800	0900		Palau, KHBN/VO Hope	9965as	9985as	15725as			
0800	0900		Papua New Guinea, NBC	4890do	9675al				
0800	0900		Russia, University Network	17765as					
0800	0900		Russia, Voice of Russia	11770au	15275au	15470au	17495au		
0800	0900		17525au	17590au	17665au				
0800	0900		Singapore, SBC Radio One	6150do					
0800	0900		South Korea, R Korea Intl	9570om	13670eu				
0800	0900		UK, BBC World Service	6190af	11760me	12095eu	15310as		
0800	0900		15360as	17640af	17885af				
0800	0900	as	UK, BBC World Service	15575as					
0800	0900	f	UK, BBC World Service	12035af	15420af				
0800	0900	s	UK, BBC World Service	9410eu					
0800	0900		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
0800	0900		6458usb	10320usb	10940usb	12579usb			
0800	0900		USA, KAJ Dallas TX	5755va					
0800	0900		USA, KNLS Anchor Point AK	11765as					
0800	0900		USA, KTBN Salt Lk City UT	7510na					
0800	0900		USA, KWHR Naalehu HI9930as	11565pa					
0800	0900		USA, WBCQ Kennebunk, ME	7415na					
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	15745na			
0800	0900		USA, WHRI Noblesville IN	5745va	7315am				
0800	0900		USA, WJCR Upton KY	13595am					
0800	0900		USA, WMLK Bethel PA	9465eu					
0800	0900	twfha	USA, WRMI Miami FL	7385na					
0800	0900		USA, WRNO New Orleans LA	7395am					
0800	0900		USA, WSHB Cypress Creek SC	9845au	9860eu				
0800	0900		USA, WTJC Newport NC	9370na					
0800	0900		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na		
0800	0900		USA, WYFR Okeechobee FL	13570va					
0800	0900	vl	Vanuatu, Radio	4960do					
0800	0900		Zambia, Christian Voice	9865af					
0805	0810		Croatia, Croatian Radio	13820au					
0815	0900		Guam, TWR 15330as						
0830	0845	f	Seychelles, FEBA Radio	15460as					
0830	0900		Australia, ABC NT Katherine	2485do					
0830	0900		Australia, ABC NT Tennant Crk	2325do					
0830	0900		Austria, AWR Europe	17780as					
0830	0900		Georgia, Georgian Radio	11910eu					
0830	0900	vl	Solomon Islands, SIBC	5020do					
0830	0900		Switzerland, Swiss R Intl	21770af					
0830	0900		USA, Voice of America	11995as	13615as	15150as	15165me	15235me	
0840	0850		Turkmenistan, Turkmen Radio	5015as					
0840	0900	s	Armenia, Voice of	4810eu	15270eu				

0900 UTC - 5AM E / 4AM C / 2AM P

0900	0915	mtwhf/vl	Solomon Islands, SIBC	5020do					
0900	0930		Australia, Radio	9580va	15420va	21820va			
0900	0930		Austria, AWR Europe	17780as					
0900	0930	irreg	Liberia, ELWA	4760do					
0900	0945		Germany, Deutsche Welle	6160pa	9510am	12035af	15410af		
			15470as	17715as	17770pa	17800af	17820as	21560af	21780af
			21790pa						
0900	0956		China, China Radio Intl	11730pa	15210pa				
0900	1000		Anguilla, Caribbean Beacon	6090am					
0900	1000		Australia, ABC NT Katherine	2485do					
0900	1000		Australia, ABC NT Tennant Crk	2325do					
0900	1000		Australia, Radio Christian Voice	13775as	15365as				
0900	1000	vl	Botswana, Radio	4820do					
0900	1000	irrg/vl	Cameroon, RTV	4850do					
0900	1000		Canada, CFRX Toronto ON	6070do					
0900	1000		Canada, CFVP Calgary AB	6030do					
0900	1000		Canada, CKZN St John's NF	6160do					
0900	1000		Canada, CKZU Vancouver BC	6160do					
0900	1000	as	Costa Rica, R for Peace Intl	7455va					
0900	1000		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am	13750na	17645as				
0900	1000		Ecuador, HCJB	11755pa	21455usb				
0900	1000	mtwhf	Eqt Guinea, Radio Africa	15185af					
0900	1000	as/vl	Eqt. Guinea, Radio East Africa	15185af					
0900	1000	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
0900	1000		Germany, Deutsche Welle	6140eu					
0900	1000	vl	Ghana, Ghana BC Corp	4915do					
0900	1000	vl	Greece, Voice of	15630eu					

0900	1000		Guam, TWR 15330as						
0900	1000		Guyana, Voice of	3290do	5950do				
0900	1000	as/vl	Italy, IRRS 7120va	7125al					
0900	1000		Liberia, R Liberia Intl	6100do					
0900	1000		Malaysia, Radio	7295do					
0900	1000	vl/s	Malta, VO Mediterranean	9605eu					
0900	1000		New Zealand, Radio NZ Intl	9885pa					
0900	1000		Nigeria, Radio/Enugu	6025do					
0900	1000		Nigeria, Radio/Ibadan	6050do					
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
0900	1000		Nigeria, Radio/Lagos	3326do	4990al				
0900	1000		Palau, KHBN/VO Hope	9965as	9985as	15725as			
0900	1000		Papua New Guinea, NBC	4890do	9675al				
0900	1000		Russia, University Network	17765as					
0900	1000		Sierra Leone, SLBS	3316do					
0900	1000		Singapore, SBC Radio One	6150do					
0900	1000	as/vl	Solomon Islands, SIBC	5020do					
0900	1000		UK, BBC World Service	6190af	6195eu	9605as	9740as	11760me	
			11945af	12095eu	15310as	15360as	15555as	15575as	17640af
			17790as	17885af	21660as				
0900	1000		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
0900	1000		USA, KAJ Dallas TX	5755va					
0900	1000		USA, KTBN Salt Lk City UT	7510na					
0900	1000		USA, KWHR Naalehu HI9930as	11565pa					
0900	1000		USA, Voice of America	11995as	13615as	15150as	15165me	15235me	
			17875af						
0900	1000		USA, WBCQ Kennebunk, ME	7415na					
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	15745na			
0900	1000		USA, WHRA Greenbush ME	7580af					
0900	1000		USA, WHRI Noblesville IN	5745va	7315am				
0900	1000		USA, WJCR Upton KY	13595am					
0900	1000	twfha	USA, WRMI Miami FL	7385na					
0900	1000		USA, WSHB Cypress Creek SC	9455sa	9860eu				
0900	1000		USA, WTJC Newport NC	9370na					
0900	1000		USA, WWCR Nashville TN	5070na	5935na	9475na	7560na		
0900	1000	vl	Vanuatu, Radio	4960do					
0900	1000	mt hfa	Vatican City, Vatican Radio	5885eu					
0930	1000		Zambia, Christian Voice	9865af					
0930	1000		Australia, Radio	9580va	15420va	17750va	21820va		
0930	1000		Georgia, Georgian Radio	11910me					
0930	1000		Lithuania, R Vilnius	9710eu					
0930	1000		Netherlands, Radio	7260va	9790va	12065va			
0940	0945		Croatia, Croatian Radio	13820au					
0945	1000	mtwhf/vl	Solomon Islands, SIBC	5020do					

1000 UTC - 6AM E / 5AM C / 3AM P

1000	1027		Czech Rep, Radio Prague Intl	21745va				
1000	1027		Vietnam, Voice of	9840au	12020au			
1000	1030		Guam, AWR11705as	11900as				
1000	1030		UK, BBC World Service	9605as	11945af	15360as		
1000	1030		UK, RTE Radio	15280au				
1000	1045		USA, KWHR Naalehu HI9930as	11565pa				
1000	1056		China, China Radio Intl	11730pa	15210pa			
1000	1056		North Korea, Voice of	9335am	9850as	11710am	11735as	
1000	1100		Anguilla, Caribbean Beacon	6090am				
1000	1100		Australia, ABC NT Katherine	2485do				
1000	1100		Australia, ABC NT Tennant Crk	2325do				
1000	1100		Australia, Radio	9580va	15420va	17750va	21820va	
1000	1100		Australia, Radio Christian Voice	13775as	15365as			
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do			
1000	1100	vl	Botswana, Radio	4820do	7255do			
1000	1100	irrg/vl	Cameroon, RTV	4850do				
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100	as	Costa Rica, R for Peace Intl	7455va				
1000	1100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eqt Guinea, Radio Africa	15185af				
1000	1100	as/vl	Eqt. Guinea, Radio East Africa	15185af				
1000	1100	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1000	1100		Germany, Deutsche Welle	6140eu				
1000	1100	vl	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	11585as	13700au	15020as	15260as	17510as
			17800au 17895au					
1000	1100	as/vl	Italy, IRRS	7120va	7125al			
1000	1100		Japan, Radio9695as	15590as	21755pa			
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100	vl/s	Malta, VO Mediterranean	9605eu				
1000	1100		Netherlands, Radio	7260va	9790va	12065va		
1000	1100		New Zealand, Radio NZ Intl	9885pa				
1000	1100		Nigeria, Radio/Enugu	6025do				
1000	1100		Nigeria, Radio/Ibadan	6050do				
1000	1100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1000	1100		Nigeria, Radio/Lagos	3326do	4990al			
1000	1100		Nigeria, Voice of	7255af				
1000	1100		Palau, KHBN/VO Hope	9965as	9985as	12160as	15725as	
1000	1100		Papua New Guinea, NBC	4890do	9675al			
1000	1100		Russia, University Network	17765as				
1000	1100		Singapore, SBC Radio One	6150do				

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1000	1100	vi	Solomon Islands, SIBC	5020do					
1000	1100		UK, BBC World Service	6190af	6195va	9740as	11760me	12095eu	
			15310as15555as	15575as	17640af	17790as	17885af	21730af	
1000	1100	as	UK, BBC World Service	15400af	17830af				
1000	1100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb12579usb	12689usb	13362usb			
1000	1100		USA, KAJI Dallas TX	5755va					
1000	1100		USA, KTBN Salt Lk City UT	7510na					
1000	1100		USA, Voice of America	5745am	5985pa	7370am9590am	11720as		
			15165me15235me	15250as	15455as	17895me			
1000	1100		USA, WRMI Miami FL	9955am	7415na				
1000	1100		USA, WEWN Birmingham AL	5825na	7425na	15395na	15745eu		
1000	1100		USA, WHRI Noblesville IN	6040na	9495am				
1000	1100		USA, WINB Red Lion PA	13570am					
1000	1100		USA, WJCR Upton KY	13595am					
1000	1100		USA, WRMI Miami FL	9955am					
1000	1100		USA, WRNO New Orleans LA	7395am					
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455sa	11780as			
1000	1100		USA, WTJC Newport NC	9370na					
1000	1100		USA, WWCN Nashville TN	5070na	5935na	7560na	15685na		
1000	1100		USA, WYFR Okeechobee FL	5950na					
1000	1100		Zambia, Christian Voice	9865af					
1030	1035		Israel, Kol Israel	15640va	17545va				
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do			
1030	1045		UK, BBC World Service	11680eu	15325eu				
1030	1100		Guam, AWR11900as						
1030	1100		Mongolia, Voice of	12085as					
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15400eu	21597eu		
1030	1100		UK, BBC World Service	9605as	11945as	17760as			
1045	1100		USA, KWHR Naalehu HI	9930as					
1045	1100	as	USA, KWHR Naalehu HI	11565pa					

1100 UTC - 7AM E / 6AM C / 4AM P

1100	1104		Pakistan, Radio	17520eu	21465eu				
1100	1105		New Zealand, Radio NZ Intl	9885pa					
1100	1120	fa	Kazakhstan, R Almaty	9620eu	11840eu				
1100	1127		Vietnam, Voice of	7285as					
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do				
1100	1130		Netherlands, Radio	7260va	9790va	12065va			
1100	1130	mtwhf	UK, BBC World Service	15220am					
1100	1130		UK, BBC World Service	15400af	17790as				
1100	1145		Germany, Deutsche Welle	11785af	15410af	17860af	21665af		
1100	1200		Anguilla, Caribbean Beacon	11775am					
1100	1200		Australia, ABC NT Katherine	2485do					
1100	1200		Australia, ABC NT Tennant Crk	2325do					
1100	1200		Australia, Radio	6020va	9475va	9580va	11650pa	11880as	
			12080pa 15420va	21820va					
1100	1200		Australia, Radio Christian Voice		13775as	15365as			
1100	1200	vi	Austria, Radio Africa Intl	17815eu					
1100	1200	vi	Botswana, Radio	4820do	7255do				
1100	1200		Bulgaria, Radio	15700eu	17500eu				
1100	1200	irrg/vl	Cameroon, RTV	4850do					
1100	1200		Canada, CBC Northern Service	9625do					
1100	1200		Canada, CFRX Toronto ON	6070do					
1100	1200		Canada, CFVP Calgary AB	6030do					
1100	1200		Canada, CKZN St John's NF	6160do					
1100	1200		Canada, CKZU Vancouver BC	6160do					
1100	1200	as	Costa Rica, R for Peace Intl	7455va					
1100	1200		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na	17645as					
1100	1200		Ecuador, HCJB	12005am	15115na	21455usb			
1100	1200	mtwhf	Eqt Guinea, Radio Africa	15185af					
1100	1200	as/vl	Eqt. Guinea, Radio East Africa	15185af					
1100	1200	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
1100	1200		Germany, Deutsche Welle	6140eu					
1100	1200	vi	Ghana, Ghana BC Corp	4915do					
1100	1200		Guyana, Voice of	3290do	5950do				
1100	1200		Iran, VOIRI	15185as	15385as	15480as	21470as	21730as	
1100	1200	as/vl	Italy, IRRS	7120va	7125al				
1100	1200		Japan, Radio6120na	9695as	15590as	21755as			
1100	1200		Jordan, Radio	11690eu					
1100	1200		Liberia, R Liberia Intl	6100do					
1100	1200		Malaysia, Radio	7295do					
1100	1200	vl/s	Malta, VO Mediterranean		9605eu				
1100	1200		Nigeria, Radio/Enugu	6025do					
1100	1200		Nigeria, Radio/Ibadan	6050do					
1100	1200		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
1100	1200		Nigeria, Radio/Lagos	3326do	4990al				
1100	1200		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as		
1100	1200		Papua New Guinea, NBC	4890do	9675al				
1100	1200		Russia, University Network	17765as					
1100	1200		Singapore, R Singapore Intl	6150as	9600as				
1100	1200		Taiwan, R Taipei Intl	7445as					
1100	1200		Taiwan, Voice of Asia	7445as					
1100	1200		UK, BBC World Service	6190af	6195va	9605as	9740as11760me		
			11945as 12095eu12105sa	15190va	15280as	15310as	15555as		
			15575as 17640af 17700eu	17760as	17830af	17885af	21660as		
1100	1200		Ukraine, R Ukraine Intl	11840na					
1100	1200		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb12579usb	12689usb	13362usb			
1100	1200		USA, KAJI Dallas TX	5755va					
1100	1200		USA, KTBN Salt Lk City UT	7510na					
1100	1200		USA, KWHR Naalehu HI	9930as					
1100	1200	as	USA, KWHR Naalehu HI	11565pa					

1100	1200		USA, Voice of America	5985pa	6110as	9645as9760as11705as			
			11720as 15250as15455as						
1100	1200		USA, WBCQ Kennebunk, ME	7415na					
1100	1200		USA, WEWN Birmingham AL	5825na	7425na	15395na	15745eu		
1100	1200		USA, WHRI Noblesville IN	6040na	9495am				
1100	1200		USA, WINB Red Lion PA	13570am					
1100	1200		USA, WJCR Upton KY	13595am					
1100	1200		USA, WRMI Miami FL	9955am					
1100	1200		USA, WRNO New Orleans LA	7395am					
1100	1200		USA, WSHB Cypress Creek SC	6095am	9455am				
1100	1200		USA, WTJC Newport NC	9370na					
1100	1200		USA, WWCN Nashville TN	5070na	5935na	7560na	15685na		
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	11725ca			
1100	1200		Zambia, Christian Voice	9865af					
1106	1200		New Zealand, Radio NZ Intl	11675pa					
1115	1145		Nepal, Radio3230as	5005as					
1120	1140	w	Kazakhstan, R Almaty	9620eu	11840eu				
1130	1145	vl	Libya, Voice of Africa	15435irr	17750irr				
1130	1155		Belgium, RVI Flanders R Intl	9865as					
1130	1157		Czech Rep. Radio Prague Intl	11640eu	21745va				
1130	1200		Austria, Radio Austria Intl	6155va	13730va	21780as			
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu			
1130	1200		South Korea, R Korea Intl	9650na					
1130	1200		Sweden, Radio	17505va	18960na				
1130	1200	mtwhf	UK, BBC World Service	15190sa					
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va				
1140	1200	f	Kazakhstan, R Almaty	9620eu	11840eu				
1155	1200	vl	Zimbabwe, ZBC Corp	5975do					

1200 UTC - 8AM E / 7AM C / 5AM P

1200	1227		Iran, VOIRI	15185as	15375as	15385as	15480as	21470as	21730as
1200	1230		France Radio France Intl	15540af	25820af				
1200	1230		Mongolia, Voice of	12015as					
1200	1230		South Korea, R Korea Intl		9650na				
1200	1230		UK, BBC World Service	17780as					
1200	1230		Uzbekistan, Radio Tashkent	9715as	5060as	5955as	5975as	6025as	
1200	1230	vl	Zimbabwe, ZBC Corp	5975do					
1200	1245		USA, WYFR Okeechobee FL	5850na	5950na				
1200	1256		China, China Radio Intl	9705as	9730as	9760pa	11760pa	11980as	
			15415pa						
1200	1259		Canada, Radio Canada Intl	9660as	15190as				
1200	1259		Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu		
1200	1300		Anguilla, Caribbean Beacon	11775am					
1200	1300		Australia, ABC NT Katherine	2485do					
1200	1300		Australia, ABC NT Tennant Crk	2325do					
1200	1300		Australia, Radio	6020va	9475va	9580va	11650pa	11880as	
			15400as 21820va						
1200	1300		Australia, Radio Christian Voice	13775as	15365as				
1200	1300		Bangladesh, Bangla Betar	7185as	9550as				
1200	1300	vl	Botswana, Radio	4820do	7255do				
1200	1300	irrg/vl	Cameroon, RTV	4850do					
1200	1300		Canada, CBC Northern Service	9625do					
1200	1300		Canada, CFRX Toronto ON	6070do					
1200	1300		Canada, CFVP Calgary AB	6030do					
1200	1300		Canada, CKZN St John's NF	6160do					
1200	1300		Canada, CKZU Vancouver BC	6160do					
1200	1300	mtwhfa	Canada, Radio Canada Intl	9515am	15305am	17820am			
1200	1300		China, Voice of Hope	7460as					
1200	1300		Costa Rica, R for Peace Intl	15040va	21815usb				
1200	1300		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na	17645as					
1200	1300		Ecuador, HCJB	12005am	15115na	21455usb			
1200	1300	as/vl	Eqt. Guinea, Radio East Africa	15185af					
1200	1300	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
1200	1300		Germany, Deutsche Welle	6140eu					
1200	1300		Germany, Overcomer Ministries	5975eu					
1200	1300	as	Germany, Remnants Hope Minstr	6110eu					
1200	1300	vl	Ghana, Ghana BC Corp	4915do					
1200	1300		Guyana, Voice of	3290do	5950do				
1200	1300	as/vl	Italy, IRRS	7120va	7125al				
1200	1300		Jordan, Radio	11690eu	17680al				
1200	1300		Liberia, R Liberia Intl	6100do					
1200	1300		Malaysia, Radio	7295do					
1200	1300		Netherlands, Radio	5965na	6045eu	9860eu			
1200	1300		New Zealand, Radio NZ Intl	11675pa					
1200	1300		Nigeria, Radio/Enugu	6025do					
1200	1300		Nigeria, Radio/Ibadan	6050do					
1200	1300		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
1200	1300		Nigeria, Radio/Lagos	3326do	4990al				
1200	1300		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as		
1200	1300	mtwhfa	Papua New Guinea, NBC	4890do	9675al				
1200	1300		Russia, University Network	17765as					
1200	1300		Singapore, R Singapore Intl	6150as	9600as				
1200	1300		Taiwan, R Taipei Intl	7130pa	9610pa				
1200	1300		UK, BBC World Service	6190af	6195va	9605as	9740as	11760me	
			11945as 12095eu	12105sa	15190va	15310as	15280as	15555as	
			15575as 17640af	17700eu	17760as	17830af	17885as	21660as	
1200	1300		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb		
1200	1300		USA, KAJI Dallas TX	5755va					
1200	1300		USA, KTBN Salt Lk City UT	7510na					
1200	1300		USA, KWHR Naalehu HI	9930as					
1200	1300	as	USA, KWHR Naalehu HI	11565pa					

Shortwave Guide



1200	1300	USA, Voice of America	6110as	9645as	9760as	11705as	11715as
		15170me	15250as	15455as	17630af		
1200	1300	USA, WBCQ Kennebunk, ME	7415na	9355na			
1200	1300	USA, WEWN Birmingham AL	5825na	7425na	15375na	15745eu	
1200	1300	USA, WHRI Noblesville IN	6040na	9495am			
1200	1300	USA, WINB Red Lion PA	13570am				
1200	1300	USA, WJCR Upton KY	13595am				
1200	1300	USA, WRMI Miami FL	9955am				
1200	1300	USA, WRNO New Orleans LA	7395am				
1200	1300	USA, WSHB Cypress Creek SC	6095am	9455am	9585as	9875as	
1200	1300	USA, WTJC Newport NC	9370na				
1200	1300	USA, WWCR Nashville TN	12160na	13845na	15685na		
1200	1300	USA, WYFR Okeechobee FL	13695va	17750am			
1200	1300	Zambia, Christian Voice	9865af				
1215	1300	Egypt, Radio Cairo	17595as				
1225	1300	Sri Lanka, SLBC	6005as	9770as	15425as		
1230	1257	Vietnam, Voice of	9840as	12020as			
1230	1300	Finland, YLE/Radio Finland	15400na	17670na			
1230	1300	Sweden, Radio	17505va	18960na	21530as		
1230	1300	Thailand, Radio	9885va				
1230	1300	Turkey, Voice of	17615va	17830eu			
1230	1300	UK, Wales Radio Intl	17615au				
1235	1300	UK, BBC World Service	7135as				
1245	1300	Seychelles, FEBA Radio	15535me				

1300 UTC - 9AM E / 8AM C / 6AM P

1300	1305	New Zealand, Radio NZ Intl	11675pa				
1300	1310	Turkmenistan, Turkmen Radio	5015as				
1300	1315	Germany, Remnants Hope Minstr	6110eu				
1300	1325	Netherlands, Radio	5965na	6045eu	9860eu		
1300	1330	Australia, Radio	6020va	9475va	9580va	11650pa	11880as
		15400as	21820va				
1300	1330	Egypt, Radio Cairo	17595as				
1300	1330	Guam, AWR15660as					
1300	1330	Turkey, Voice of	17615va	17830va			
1300	1345	UK, BBC World Service	17720as				
1300	1356	China, China Radio Intl	9750na	11760pa	11900pa	11980as	13650va
		15180as					
1300	1356	North Korea, Voice of	7505eu	9335na	11335eu	11710na	
1300	1400	Anguilla, Caribbean Beacon	11775am				
1300	1400	Australia, ABC NT Katherine	2485do				
1300	1400	Australia, ABC NT Tennant Crk	2325do				
1300	1400	Australia, Radio Christian Voice	13660as	13775as			
1300	1400	Botswana, Radio	4820do	7255do			
1300	1400	Cameroon, RTV	4850do				
1300	1400	Canada, CBC Northern Service	9625do				
1300	1400	Canada, CFRX Toronto ON	6070do				
1300	1400	Canada, CFVP Calgary AB	6030do				
1300	1400	Canada, CKZN St John's NF	6160do				
1300	1400	Canada, CKZU Vancouver BC	6160do				
1300	1400	Canada, Radio Canada Intl	9515am	15305am	17820am		
1300	1400	China, Voice of Hope	7460as				
1300	1400	Costa Rica, R for Peace Intl	15040va	21815usb			
1300	1400	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am	13750na	17645as			
1300	1400	Ecuador, HCJB	12005am	15115na	21455usb		
1300	1400	Eat. Guinea, Radio East Africa	15185af				
1300	1400	Finland, Scandv Weekend Radio	6170va	11720va			
1300	1400	Germany, Deutsche Welle	6140eu				
1300	1400	Germany, Overcomer Ministries	5975eu	13810af			
1300	1400	Ghana, Ghana BC Corp	4915do				
1300	1400	Guyana, Voice of	3290do	5950do			
1300	1400	Italy, IRRS	7120va	7125al			
1300	1400	Jordan, Radio	11690eu	17680al			
1300	1400	Liberia, R Liberia Intl	6100do				
1300	1400	Malaysia, Radio	7295do				
1300	1400	Nigeria, Radio/Enugu	6025do				
1300	1400	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1300	1400	Nigeria, Radio/Lagos	3326do	4990al			
1300	1400	Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1300	1400	Papua New Guinea, NBC	4890do	9675al			
1300	1400	Russia, University Network	17765as				
1300	1400	S Africa, Channel Africa	11720af	17780af	21725af		
1300	1400	Singapore, R Singapore Intl	6150as	9600as			
1300	1400	South Korea, R Korea Intl	9570as	13670om			
1300	1400	Sri Lanka, SLBC	6005as	9770as	15425as		
1300	1400	UAE, AWR	17740as				
1300	1400	Uganda, Radio	4976do	5026al	7195al		
1300	1400	UK, BBC World Service	6190af	6195va	9605as	9740as	11760me
		12095eu	12105sa	15190va	15285as	15310as	15555as
		17640af	17700eu	17760as	17830af	21470af	
1300	1400	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1300	1400	USA, KAIJ Dallas TX	5755va				
1300	1400	USA, KNLS Anchor Point AK	11870as				
1300	1400	USA, KTBN Salt Lk City UT	7510na				
1300	1400	USA, KWHR Naalehu HI	9930as				
1300	1400	USA, KWHR Naalehu HI	11565pa				
1300	1400	USA, Voice of America	6110as	9645as	9760as	11705as	15170me
		15260me	15455as	17630af			
1300	1400	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na		
1300	1400	USA, WEWN Birmingham AL	5825na	11875na	11530na	11550na	15375na
		15745eu					
1300	1400	USA, WHRI Noblesville IN	6040na	15105am			

1300	1400	USA, WINB Red Lion PA	13570am				
1300	1400	USA, WJCR Upton KY	13595am				
1300	1400	USA, WRMI Miami FL	15725na				
1300	1400	USA, WRNO New Orleans LA	7395am				
1300	1400	USA, WSHB Cypress Creek SC	9430na	9455am	9940as		
1300	1400	USA, WTJC Newport NC	9370na				
1300	1400	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1300	1400	USA, WWRB Manchester TN	9320va	9400va	9495va	12172va	
1300	1400	USA, WYFR Okeechobee FL	11830na	11865na	11970am	17510sa	
		17750am					
1300	1400	Zambia, Christian Voice	9865af				
1306	1400	New Zealand, Radio NZ Intl	6095pa				
1330	1345	UK, BBC World Service	21640af				
1330	1350	UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu	
1330	1357	Vietnam, Voice of	7145eu	9730eu			
1330	1400	Australia, Radio	6020va	9475as	9580va	11650pa	11660as
		11880as	21820va				
1330	1400	Austria, Radio Austria Intl		6155va	13730va		
1330	1400	Guam, AWR11755as	11980as				
1330	1400	India, All India Radio	11620as	13710as			
1330	1400	Laos, Lao National Radio	7145as				
1330	1400	Serbia & Montenegro, R Yugo	11835au				
1330	1400	Sweden, Radio	17505va	18960na			
1330	1400	UAE, AWR	15320as				
1330	1400	UK, BBC World Service	11835as				
1330	1400	Uzbekistan, Radio Tashkent	9715as	5060as	5955as	5975as	6025as
1345	1400	UK, BBC World Service	15105af	15595eu	17810sa	21640af	

1400 UTC - 10AM E / 9AM C / 7AM P

1400	1415	mtwhf	UK, BBC World Service	7110as	15365as			
1400	1415	mtw	UK, BBC World Service	21490af				
1400	1415	tf	UK, BBC World Service	11860af	21490af			
1400	1427		Czech Rep, Radio Prague Intl		21745va			
1400	1430		Ecuador, HCJB	12005am	15115na	21455usb		
1400	1430		Mexico, Radio Mexico Intl		9705am	11770am		
1400	1430		Thailand, Radio	9830va				
1400	1430		UK, BBC World Service	15595eu				
1400	1430	s	USA, Voice of America	18275as				
1400	1455	as	S Africa, Channel Africa	11720af	17780af	21725af		
1400	1456		China, China Radio Intl	7405na	9700as	11675as	11765va	13650va
			13685af	15125af	17720na			
1400	1500		Anguilla, Caribbean Beacon		11775am			
1400	1500		Australia, ABC NT Katherine		2485do			
1400	1500		Australia, ABC NT Tennant Crk		2325do			
1400	1500		Australia, Radio	5995va	6080pa	9580va	11650pa	
1400	1500		Australia, Radio Christian Voice		13660as	17560as		
1400	1500	vl	Botswana, Radio	4820do	7255do			
1400	1500		Canada, CBC Northern Service		9625do			
1400	1500		Canada, CFRX Toronto ON		6070do			
1400	1500		Canada, CFVP Calgary AB		6030do			
1400	1500		Canada, CKZN St John's NF		6160do			
1400	1500		Canada, CKZU Vancouver BC		6160do			
1400	1500	mtwhfa	Canada, Radio Canada Intl		9515am	15305am	17820am	
1400	1500		China, Voice of Hope	7460as				
1400	1500		Costa Rica, R for Peace Intl		15040va	21815usb		
1400	1500		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am	13750na	17645as			
1400	1500	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1400	1500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1400	1500		France Radio France Intl	9580as	11600me	17620me		
1400	1500		Germany, Deutsche Welle		6140eu			
1400	1500		Germany, Overcomer Ministries		5975eu	13810af		
1400	1500	vl	Ghana, Ghana BC Corp		4915do			
1400	1500		Guyana, Voice of	3290do	5950do			
1400	1500		India, All India Radio	11620as	13710as			
1400	1500	as/vl	Italy, IRRS	7120va	7125al			
1400	1500		Japan, Radio7200as	9505na	9845as	17755va		
1400	1500		Jordan, Radio	11690eu	17680al			
1400	1500		Liberia, R Liberia Intl	6100do				
1400	1500	occasional	Malaysia, Radio	7295do				
1400	1500		New Zealand, Radio NZ Intl		6095pa			
1400	1500		Nigeria, Radio/Enugu	6025do				
1400	1500		Nigeria, Radio/Ibadan	6050do				
1400	1500		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1400	1500		Nigeria, Radio/Lagos	3326do	4990al			
1400	1500		Oman, Radio	15140va				
1400	1500		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1400	1500	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
1400	1500		Romania, R Romania Intl		11940eu	15365eu	17790eu	
1400	1500		Russia, University Network		17765as			
1400	1500		Russia, Voice of Russia	6205as	7260na	7350as	9875as	11500as
			15735am					
1400	1500		Singapore, SBC Radio One		6150do			
1400	1500		Sri Lanka, SLBC	6005as	9770as	15425as		
1400	1500		Taiwan, R Taipei Intl	15265as				
1400	1500		Uganda, Radio	4976do	5026al	7195al		
1400	1500		UK, BBC World Service	6190af	6195va	9605as	9740as	12095eu
			12105sa	15105af	15190va	15310as	15285as	15420af
			15575eu	17640af	17700eu	17830af	21470af	15555as
1400	1500		UK, BBC World Service	17810sa	21640af			
1400	1500		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1400	1500		USA, KAIJ Dallas TX	13815va				
1400	1500		USA, KJES Vado NM	11715na				

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1400	1500	USA, KTBN Salt Lk City UT	7510na		
1400	1500	USA, KWHR Naalehu HI 9930as			
1400	1500	USA, KWHR Naalehu HI 11565pa			
1400	1500	USA, Voice of America 6110as	7125as	9645as	9760as 11705as
		15205as 15395as 15455as			
1400	1500	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na 17495na
1400	1500	USA, WEWN Birmingham AL	11875na	11530na	11550na 15375na
		15745eu			
1400	1500	USA, WHRI Noblesville IN	6040na	15105am	
1400	1500	USA, WINB Red Lion PA 13570am			
1400	1500	USA, WJCR Upton KY 13595am			
1400	1500	USA, WRMI Miami FL 15725na			
1400	1500	USA, WRNO New Orleans LA	7395am		
1400	1500	USA, WTJC Newport NC	9370na		
1400	1500	USA, WWCN Nashville TN	9475na	12160na	13845na 15685na
1400	1500	USA, WWRB Manchester TN	9320na	9400na	12172na
1400	1500	USA, WYFR Okeechobee FL	11830na	11865na	11970am 17510sa
		17750am			
1400	1500	Zambia, Christian Voice 9865af			
1415	1420	Nepal, Radio 3230as	5005as		
1430	1500	Guam, AWR 15660as			
1430	1500	Guam, TWR 15330as			
1430	1500	Myanmar, Radio	5985do		
1430	1500	Netherlands, Radio	12070as	12080as	15220na 15595as
1430	1500	UK, BBC World Service 5990am			
1445	1500	f Seychelles, FEBA Radio	11600as		

1500 UTC - 11AM E / 10AM C / 8AM P

1500	1515	UK, BBC World Service 6195as			
1500	1530	Australia, Radio	5995va	6080pa	9580va 11650pa
1500	1530	Mexico, Radio Mexico Intl		9705am	11770am
1500	1530	S Africa, Channel Africa 17770af			
1500	1530	h Seychelles, FEBA Radio	11600as		
1500	1530	UK, BBC World Service 9605as	12105sa	15285as	
1500	1530	USA, Voice of America 7125as	9645as	15205as	15395as
1500	1530	USA, WRMI Miami FL 15725na			
1500	1556	China, China Radio Intl 7160as	7405na	9785as	13685af 15125af
		17720na			
1500	1556	North Korea, Voice of	7505eu	9335na	11335eu 11710na
1500	1557	Canada, Radio Canada Intl	15455as	17720as	
1500	1600	Anguilla, Caribbean Beacon	11775am		
1500	1600	Australia, ABC NT Katherine	2485do		
1500	1600	Australia, ABC NT Tennant Crk	2325do		
1500	1600	Australia, Radio Christian Voice	13660as	17560as	
1500	1600	vi Austria, Radio Africa Intl 17895eu			
1500	1600	Botswana, Radio	4820do	7255do	
1500	1600	irrg/vl Cameroon, RTV	4850do		
1500	1600	Canada, CBC Northern Service		9625do	
1500	1600	Canada, CFRX Toronto ON	6070do		
1500	1600	Canada, CFVP Calgary AB	6030do		
1500	1600	Canada, CKZN St John's NF	6160do		
1500	1600	Canada, CKZU Vancouver BC	6160do		
1500	1600	s Canada, Radio Canada Intl	17800am		
1500	1600	China, Voice of Hope 7460as			
1500	1600	Costa Rica, R for Peace Intl	15040va	21815usb	
1500	1600	Costa Rica, University Network	5030am	6150am	7375am 9725sa
		11870am 13750na 17645as			
1500	1600	as/vl Eqt. Guinea, Radio East Africa	15185af		
1500	1600	a/monthly Finland, Scandv Weekend Radio	5990va	11720va	
1500	1600	Germany, Deutsche Welle	6140eu		
1500	1600	Germany, Overcomer Ministries	5975eu	13810af	
1500	1600	Germany, Overcomer Ministries	6110af		
1500	1600	vi Ghana, Ghana BC Corp	4915do		
1500	1600	Guam, TWR 15330as			
1500	1600	Guyana, Voice of	3290do	5950do	
1500	1600	Italy, IRRS 7120va	7125al		
1500	1600	Japan, Radio 7200as	9505na	9750as	9845as 17755va
1500	1600	Jordan, Radio	11690na		
1500	1600	Liberia, R Liberia Intl	6100do		
1500	1600	Malaysia, Radio	7295do		
1500	1600	Myanmar, Radio	5985do		
1500	1600	Netherlands, Radio	12070as	12080as	15220na 15595as
1500	1600	occasional New Zealand, Radio NZ Intl	6095pa		
1500	1600	Nigeria, Radio/Enugu	6025do		
1500	1600	Nigeria, Radio/Ibadan	6050do		
1500	1600	Nigeria, Radio/Kaduna	4770do	6090do	9570do
1500	1600	Nigeria, Radio/Lagos	3326do	4990al	
1500	1600	Nigeria, Voice of	7255af		
1500	1600	Palau, KHBN/VO Hope 9965as	9985as	12160as	13840as
1500	1600	Papua New Guinea, NBC	4890do	9675al	
1500	1600	Russia, Voice of Russia	4965as	6005me	7260na 7305as
		9830me 15735am			
1500	1600	Russia, World Beacon	15340eu		
1500	1600	Singapore, SBC Radio One	6150do		
1500	1600	Sri Lanka, SLBC	6005as	15425as	
1500	1600	Uganda, Radio	4976do	5026al	7195al
1500	1600	UK, BBC World Service 5975am	6190af	6195va	9740as 12095eu
		15190va 15310as 15400af	15420af	15555as	17700eu 17830af
		17860af 21470af 21660af			
1500	1600	as UK, BBC World Service 9635af		21490af	
1500	1600	UK, World Beacon	15340eu		
1500	1600	USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
		6458usb 10320usb 10940usb 12579usb		12689usb	13362usb
1500	1600	USA, KAIJ Dallas TX	13815va		
1500	1600	USA, KJES Vado NM	11715na		

1500	1600	USA, KTBN Salt Lk City UT	7510na		
1500	1600	USA, KWHR Naalehu HI 9930as			
1500	1600	USA, KWHR Naalehu HI 11565pa			
1500	1600	as USA, Voice of America 6110as	9760as	12040as	15460as
1500	1600	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na 17495na
1500	1600	USA, WEWN Birmingham AL	11875na	11530na	11550na 15375na
		15745eu			
1500	1600	USA, WHRI Noblesville IN	6040na	15105am	
1500	1600	USA, WINB Red Lion PA 13570am			
1500	1600	USA, WJCR Upton KY 13595am			
1500	1600	USA, WRNO New Orleans LA	7395am	15420am	
1500	1600	USA, WTJC Newport NC	9370na		
1500	1600	USA, WWCN Nashville TN	9475na	12160na	13845na 15685na
1500	1600	USA, WYFR Okeechobee FL	11830na	17750am	
1500	1600	Zambia, Christian Voice 4965af			
1500	1600	vi Zambia, Radio ZNBC	4910do	6265al	
1515	1545	twf Seychelles, FEBA Radio	11600as		
1515	1600	m Seychelles, FEBA Radio	11600as		
1530	1600	Australia, Radio	5995va	6080pa	9475as 9580va 11650pa
1530	1600	Austria, Radio Austria Intl		9870na	17860na
1530	1600	Botswana, Radio	3356do	4820do	7255do
1530	1600	Iran, VOIRI 9605as	11640eu	11870as	
1530	1600	as Seychelles, FEBA Radio	11600as		
1530	1600	UK, BBC World Service	11860af		
1530	1600	USA, Voice of America 7125as	9575as	9645as	11955me 13735me
		15120me 15205as 15265me	15395as		
1530	1600	mtwhf USA, WRMI Miami FL	15725na		
1530	1600	vi Zimbabwe, ZBC Corp	5975do		
1540	1550	Turkmenistan, Turkmen Radio	4930as		
1550	1600	Vatican City, Vatican Radio	9865au	13765au	15235au

1600 UTC - 12PM E / 11AM C / 9AM P

1600	1610	Vatican City, Vatican Radio	9865au	13765au	15235au
1600	1615	Pakistan, Radio	11570me	15100me	15725af 17750af
1600	1625	Netherlands, Radio	12070as	12080as	15220na 15595as
1600	1627	Iran, VOIRI 9605as	11640eu	11870as	
1600	1627	Vietnam, Voice of	7145eu	9730eu	
1600	1630	Israel, Kol Israel	15615va	17545va	
1600	1630	Jordan, Radio	11690na	17680al	
1600	1630	S Africa, Channel Africa 9525af			
1600	1630	UK, BBC World Service 9535af	11955as	15555as	
1600	1640	UAE, Emirates Radio	13630eu	13675eu	15400eu 21597al
1600	1645	a/monthly Finland, Scandv Weekend Radio	5990va	11720va	
1600	1645	Germany, Deutsche Welle	6170as	7225as	9735af 11665af
		17595as 21840af			
1600	1650	occasional New Zealand, Radio NZ Intl	6095pa		
1600	1656	China, China Radio Intl 7190af	13650af		
1600	1656	North Korea, Voice of	9975af		
1600	1700	Algeria, Radio Algiers Intl	11715eu	15160eu	
1600	1700	Anguilla, Caribbean Beacon	11775am		
1600	1700	Australia, ABC NT Katherine	2485do		
1600	1700	Australia, ABC NT Tennant Crk	2325do		
1600	1700	Australia, Radio	5995va	6080pa	9580va 11650pa 11660va
1600	1700	Australia, Radio Christian Voice	13660as	17560as	
1600	1700	vi Botswana, Radio	3356do	4820do	7255do
1600	1700	irrg/vl Cameroon, RTV	4850do		
1600	1700	Canada, CBC Northern Service		9625do	
1600	1700	Canada, CFRX Toronto ON	6070do		
1600	1700	Canada, CFVP Calgary AB	6030do		
1600	1700	Canada, CKZN St John's NF	6160do		
1600	1700	Canada, CKZU Vancouver BC	6160do		
1600	1700	Costa Rica, R for Peace Intl	15040va	21815usb	
1600	1700	Costa Rica, University Network	5030am	6150am	7375am 9725sa
		11870am 13750na			
1600	1700	Ethiopia, Radio	5990do	7110af	7165af 9560af 9704af
		11800af			
1600	1700	France Radio France Intl 11615af	11995af	12015af	15605af 17605af
		17850af			
1600	1700	Germany, Deutsche Welle	6140eu		
1600	1700	vi Ghana, Ghana BC Corp	4915do		
1600	1700	Guyana, Voice of	3290do	5950do	
1600	1700	Liberia, R Liberia Intl	6100do		
1600	1700	Malaysia, Radio	7295do		
1600	1700	Namibia, NBC	3270do	3290al	
1600	1700	Nigeria, Radio/Enugu	6025do		
1600	1700	Nigeria, Radio/Ibadan	6050do		
1600	1700	Nigeria, Radio/Kaduna	4770do	6090do	9570do
1600	1700	Nigeria, Radio/Lagos	3326do	4990al	
1600	1700	Nigeria, Voice of	7255af		
1600	1700	Palau, KHBN/VO Hope 9965as			
1600	1700	Papua New Guinea, NBC	4890do	9675al	
1600	1700	Russia, Voice of Russia	5980me	7260na	9470me 9830me 15735am
1600	1700	Russia, World Beacon	15340eu		
1600	1700	South Korea, R Korea Intl	5975om	9515af	9870af
1600	1700	Taiwan, R Taipei Intl	11550as		
1600	1700	vi UAE, AWR 9600eu			
1600	1700	Uganda, Radio	4976do	5026al	7195al
1600	1700	as UK, BBC World Service 12095eu			
1600	1700	UK, BBC World Service 5975as	6190af	6195va	7160af 11860af
		15190va 15310as 15400af	17700eu	17830af	17860af 21470af
		21660af			
1600	1700	UK, World Beacon	15340eu		
1600	1700	USA, Armed Forces Network	4319usb	4993usb	5765usb 6350usb
		6458usb 10320usb 10940usb 12579usb		12689usb	13362usb

Shortwave Guide



1600	1700	USA, KAIJ Dallas TX	13815va						
1600	1700	USA, KJES Vado NM	11715na						
1600	1700	USA, KTBN Salt Lk City UT		15590na					
1600	1700	USA, KWHR Naalehu HI	9930as						
1600	1700	USA, Voice of America	6035af	6110as	7125as	9575as	9645as		
			9760as	11950me	13600af	13710af	13735me	15120me	15205as
			15240af	15395as	15445af	17640af	17715af	17895af	
1600	1700	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na			
1600	1700	USA, WEWN Birmingham AL	11530na	11550na	13615na	15375na			
			15745eu						
1600	1700	USA, WHRA Greenbush ME	17650af						
1600	1700	USA, WHRI Noblesville IN	13760va	15105am					
1600	1700	USA, WINB Red Lion PA	13570am						
1600	1700	USA, WJCR Upton KY	13595am						
1600	1700	USA, WMLK Bethel PA	9465eu						
1600	1700	mtwhf USA, WRMI Miami FL	15725na						
1600	1700	USA, WRNO New Orleans LA	7395am	15420am					
1600	1700	USA, WSHB Cypress Creek SC	18910af						
1600	1700	USA, WTJC Newport NC	9370na						
1600	1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na			
1600	1700	USA, WYFR Okeechobee FL	11830na	17750am	18980eu	21455eu			
			21525af						
1600	1700	Zambia, Christian Voice	4965af						
1600	1700	vi Zambia, Radio ZNBC	4910do	6265al					
1610	1625	Armenia, TWR	5855eu						
1615	1630	Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645eu		
			15595eu						
1630	1700	Egypt, Radio Cairo	15255af						
1630	1700	Georgia, Georgian Radio		6180me					
1630	1700	Guam, AWR11980as							
1630	1700	Slovakia, R. Slovakia Intl	5920eu	6055eu	7345eu				
1645	1700	a/monthly Finland, Scandv Weekend Radio		6170va	11720va				
1645	1700	Tajikistan, Radio	7245as						
1650	1700	mtwhf New Zealand, Radio NZ Intl		6095pa					

1700 UTC - 1PM E / 12PM C / 10AM P

1700	1705	mtwhf UK, BBC World Service	13645eu						
1700	1727	Czech Rep, Radio Prague Intl	5930eu	17485eu					
1700	1727	Vietnam, Voice of	12070eu						
1700	1730	a/monthly Finland, Scandv Weekend Radio	6170va	11720va					
1700	1730	France Radio France Intl	11615af	15605af	17605af				
1700	1730	S Africa, Channel Africa	17870af						
1700	1730	UK, BBC World Service	11955eu	11965as	15495eu	15585me			
1700	1756	China, China Radio Intl	7150af	9570af	9670va	9695af	11910af		
1700	1759	Poland, Radio Polonia	5995eu	7285eu					
1700	1800	Anguilla, Caribbean Beacon	11775am						
1700	1800	Australia, ABC NT Katherine	2485do						
1700	1800	Australia, ABC NT Tennant Crk	2325do						
1700	1800	Australia, Radio	5995va	9475as	9580va	11880va			
1700	1800	Australia, Radio Christian Voice	13660as	17560as					
1700	1800	vi Botswana, Radio	3356do	4820do	7255do				
1700	1800	Canada, CBC Northern Service	9625do						
1700	1800	Canada, CFRX Toronto ON	6070do						
1700	1800	Canada, CFVP Calgary AB	6030do						
1700	1800	Canada, CKZN St John's NF	6160do						
1700	1800	Canada, CKZU Vancouver BC	6160do						
1700	1800	Costa Rica, R for Peace Intl	15040va	21815usb					
1700	1800	Costa Rica, University Network	5030am	6150am	7375am	9725sa			
			11870am	13750na	17645as				
1700	1800	Egypt, Radio Cairo	15255af						
1700	1800	mtwhf Eqt Guinea, Radio Africa	15185af						
1700	1800	Germany, Deutsche Welle	6140eu						
1700	1800	a Germany, Overcomer Ministries	6110af						
1700	1800	Germany, Unt. Methodist Church	11735af	13820af					
1700	1800	vi Ghana, Ghana BC Corp	3366do	4915do					
1700	1800	Guyana, Voice of	3290do						
1700	1800	Japan, Radio9505na	11970eu	15355af					
1700	1800	Liberia, R Liberia Intl	6100do						
1700	1800	Malaysia, Radio	7295do						
1700	1800	vi/mtwhf Malta, VO Mediterranean	9605eu						
1700	1800	Namibia, NBC	3270do	3290al					
1700	1800	mtwhf New Zealand, Radio NZ Intl	6095pa						
1700	1800	Nigeria, Radio/Enugu	6025do						
1700	1800	Nigeria, Radio/Ibadan	6050do						
1700	1800	Nigeria, Radio/Kaduna	4770do	6090do	9570do				
1700	1800	Nigeria, Radio/Lagos	3326do	4990al					
1700	1800	mtwhf Papua New Guinea, NBC	4890do	9675al					
1700	1800	Romania, R Romania Intl	9625af	11830eu	11940eu	15245eu			
1700	1800	Russia, Voice of Russia	7260na	7335af	7340eu	9775eu	9830af		
			11510af	11510af	15735am				
1700	1800	as Russia, Voice of Russia	5940eu	6175eu					
1700	1800	Russia, World Beacon	9575eu						
1700	1800	Taiwan, R Taipei Intl	11550as						
1700	1800	as Uganda, Radio	4976do	5026al	7195al				
1700	1800	UK, BBC World Service	9635af						
1700	1800	UK, World Beacon	9575eu						
1700	1800	USA, Armed Forces Network	6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1700	1800	USA, KAIJ Dallas TX	13815va						
1700	1800	USA, KTBN Salt Lk City UT		15590na					
1700	1800	USA, KWHR Naalehu HI	9930as						
1700	1800	USA, Voice of America	6040af	6110as	7125as	9645as	9760as		
			13710af	15205as	15240af	15395as	15445af	17895af	

1700	1800	mtwhf USA, Voice of America	5990as	6045as	9525as	9670as	9795as		
			11955as	12005as	15255as				
1700	1800	USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na			
1700	1800	USA, WEWN Birmingham AL	11530na	11550na	13615na	15745na			
			17595eu						
1700	1800	USA, WHRA Greenbush ME	17650af						
1700	1800	USA, WHRI Noblesville IN	13760va	15105am					
1700	1800	USA, WINB Red Lion PA	13570am						
1700	1800	USA, WJCR Upton KY	13595am						
1700	1800	USA, WMLK Bethel PA	15265eu						
1700	1800	mtwhf USA, WRMI Miami FL	15725na						
1700	1800	USA, WRNO New Orleans LA	7395am	15420am					
1700	1800	USA, WSHB Cypress Creek SC	18910af						
1700	1800	USA, WTJC Newport NC	9370na						
1700	1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na			
1700	1800	USA, WWRB Manchester TN	9495va	12172va					
1700	1800	USA, WYFR Okeechobee FL	18980eu	21455eu					
1700	1800	Zambia, Christian Voice	4965af						
1730	1745	vi Libya, Voice of Africa	15435irr	17750irr					
1730	1745	Swaziland, TWR	9500af						
1730	1745	mtwhf Swaziland, TWR	3200af						
1730	1755	mtwhf/vl UK, United Nations Radio	6125af	15495me	17580af				
1730	1800	Belgium, RVI Flanders R Intl	9925eu	13690eu	13710eu				
1730	1800	a/monthly Finland, Scandv Weekend Radio	6170va	11690va					
1730	1800	Guam, AWR7455as	9385me	11560me					
1730	1800	irreg Liberia, ELWA	4760do						
1730	1800	Netherlands, Radio	6020af	11655as					
1730	1800	S Africa, AWR Africa	12130af						
1730	1800	mtwhf Sweden, Radio	6065va	13580va					
1730	1800	Switzerland, Swiss R Intl	15220va	17735va	21720va				
1730	1800	Vatican City, Vatican Radio	13765af	15570af	17515af				
1735	1745	vi/th Paraguay, Radio Nacional	9739sa						
1745	1746	UK, BBC World Service	7230af						
1745	1800	Bangladesh, Bangla Betar	7185eu	9550eu	15520eu				
1745	1800	India, All India Radio	7410eu	11620eu	11935va	13605af	15155af		
			17670af						
1745	1800	smtwhf Swaziland, TWR	3200af						
1746	1800	UK, BBC World Service	9630af	11860af					

1800 UTC - 2PM E / 1PM C / 11AM P

1800	1815		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1800	1827		Vietnam, Voice of	5955eu	7145eu	9730eu		
1800	1830		Azerbaijan, Voice of	6110eu	9155eu			
1800	1830		Egypt, Radio Cairo	15255af				
1800	1830	s	Germany, Universal Life/Santec		15750af			
1800	1830		Netherlands, Radio	6020af	11655af			
1800	1830		S Africa, AWR Africa	5960af	6100af			
1800	1830		S Africa, Channel Africa	17870af				
1800	1830		UK, BBC World Service	5975as	6050eu	9510as	17885af	21630af
1800	1830		UK, RTE Radio	15585me				
1800	1830	vl	Zimbabwe, ZBC Corp	4828do				
1800	1850	mtwhf	New Zealand, Radio NZ Intl		6095pa			
1800	1857		Czech Rep. Radio Prague Intl	5930eu	7315va			
1800	1858		Yemen, Rep of Yemen Radio	9780me				
1800	1900		Anguilla, Caribbean Beacon	11775am				
1800	1900		Australia, ABC NT Katherine	2485do				
1800	1900		Australia, ABC NT Tennant Crk	2325do				
1800	1900		Australia, Radio	6080as	7240pa	9430va	9475as	9580va
			11880va					
1800	1900		Australia, Radio Christian Voice	6010as	7170as			
1800	1900	vl	Botswana, Radio	3356do	4820do	7255do		
1800	1900	irreg/vl	Cameroon, RTV	4850do				
1800	1900		Canada, CBC Northern Service	9625do				
1800	1900		Canada, CFRX Toronto ON	6070do				
1800	1900		Canada, CFVP Calgary AB	6030do				
1800	1900		Canada, CKZN St John's NF	6160do				
1800	1900		Canada, CKZU Vancouver BC	6160do				
1800	1900		Costa Rica, R for Peace Intl	15040va	21815usb			
1800	1900		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
1800	1900	mtwhf	Eqt Guinea, Radio Africa		15185af			
1800	1900	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1800	1900		Germany, Deutsche Welle	6140eu				
1800	1900		Germany, Unt. Methodist Church	11735af	13820af			
1800	1900	vl	Ghana, Ghana BC Corp	3366do	4915do			
1800	1900	vl	Greece, Voice of	12105eu				
1800	1900		Guyana, Voice of	3290do	5950do			
1800	1900		India, All India Radio	7410as	11620eu	11935va	13605af	15155af
			17670af					
1800	1900	vl	Italy, IRRS	3980al	3985va			
1800	1900		Kenya, Kenya BC Corp	4885do				
1800	1900		Kuwait, Radio	11990va				
1800	1900	irreg	Liberia, ELWA	4760do				
1800	1900		Liberia, R Liberia Intl	5100do				
1800	1900		Malaysia, Radio	7295do				
1800	1900		Namibia, NBC	3270do	3290al			
1800	1900		Nigeria, Radio/Enugu	6025do				
1800	1900		Nigeria, Radio/Ibadan	6050do				
1800	1900		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1800	1900		Nigeria, Radio/Lagos	3326do	4990al			
1800	1900	mtwhfa	Papua New Guinea, NBC	4890do	9675al			
1800	1900		Russia, Voice of Russia	5940eu	5950eu	6175eu/7335af/7340eu		
			7360eu 7440eu/9775eu/9875af		11510af			
1800	1900		Russia, World Beacon	3230af	9575eu	17850af		
1800	1900		S Africa, African Beacon	3230af				

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1800	1900	Swaziland, TWR	3200af	9500af			
1800	1900	Taiwan, R Taipei Intl	3955eu				
1800	1900	Uganda, Radio	4976do	5026al	7195al		
1800	1900	UK, BBC World Service	3255af	6190af	6195eu	9410eu	12095eu
		15310as	15400af	15420af	17830af	21470af	
1800	1900	as	UK, BBC World Service	9635af			
1800	1900		UK, World Beacon	3230af	9575eu	17850af	
1800	1900		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb	10320usb	10940usb	12579usb	13362usb
1800	1900		USA, KAJI Dallas TX	13815va			
1800	1900		USA, KAJI Dallas TX	13815va			
1800	1900		USA, KWHR Naalehu HI	9930as	15590na		
1800	1900		USA, Voice of America	6035af	6040af	9760as	9840as
			13710af	15240af	15580af		
1800	1900		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na
1800	1900		USA, WEWN Birmingham AL	11530na	11550na	13615na	15745na
			17595eu				
1800	1900		USA, WHRA Greenbush ME	17650af			
1800	1900		USA, WHRI Noblesville IN	9495am	13760va		
1800	1900		USA, WINB Red Lion PA	13570am			
1800	1900		USA, WJCR Upton KY	13595am			
1800	1900		USA, WMLK Bethel PA	15265eu			
1800	1900	mtwhf	USA, WRMI Miami FL	15725na			
1800	1900		USA, WRNO New Orleans LA	7395am	15420am		
1800	1900		USA, WSHB Cypress Creek SC	15665eu	18910af		
1800	1900		USA, WTJC Newport NC	9370na			
1800	1900		USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
1800	1900		USA, WYFR Okeechobee FL	18980eu			
1800	1900	vl	Vanuatu, Radio	4960do	7260do		
1800	1900		Zambia, Christian Voice	4965af			
1800	1900	vl	Zambia, Radio ZNBC	4910do	6265al		
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu	
1830	1900		Austria, Radio Austria Intl	5945va	6155va		
1830	1900	mtwhf	Georgia, Georgian Radio	6230eu			
1830	1900	as	Georgia, Georgian Radio	11910as			
1830	1900		Netherlands, Radio	6002af	9895af	11655af	13700af
1830	1900		Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	17605af
1830	1900		Turkey, Voice of	9785eu			
1830	1900		UK, BBC World Service	6005af			
1830	1900		UK, RTE Radio	13640na	21630af		
1830	1900	as	USA, Voice of America	13675af	15160af	17640af	
1845	1900	mtwhf	Albania, Radio Tirana Intl	7210na	9520na		
1851	1900	mtwhf	New Zealand, Radio NZ Intl	11725pa			

1900 UTC - 3PM E / 2PM C / 12PM P

1900	1925	Israel, Kol Israel	9435va	11605va	15615va	15640af	17545va
1900	1927	Vietnam, Voice of	7145eu	9730eu			
1900	1930	Hungary, Radio Budapest	6025eu	7130eu			
1900	1930	Turkey, Voice of	9785eu				
1900	1930	USA, Voice of America	9785me	12015me	13640me		
1900	1945	Germany, Deutsche Welle	17810af	11805af	11965af	13720af	15390af
1900	1945	India, All India Radio	7410as	11620eu	11935va	13605af	15155af
			17670af				
1900	1945	vl	Zimbabwe, ZBC Corp	4828do	5012do		
1900	1950	mtwhf	New Zealand, Radio NZ Intl	11725pa			
1900	1956		China, China Radio Intl	9440af	9585af	13790af	
1900	1956		North Korea, Voice of	7505eu	11334eu		
1900	2000	mtwhf	Anguilla, Caribbean Beacon	11775am			
1900	2000		Argentina, RAE	9690eu	15345eu		
1900	2000		Australia, ABC NT Katherine	2485do			
1900	2000		Australia, ABC NT Tennant Crk	2325do			
1900	2000		Australia, Radio	6080as	7240pa	9500as	9580va
1900	2000		Australia, Radio Christian Voice	6010as	7170as	11880va	
1900	2000	vl	Botswana, Radio	3356do	4820do	7255do	
1900	2000		Bulgaria, Radio	5800eu	7500eu		
1900	2000	irrg/vl	Cameroon, RTV	4850do			
1900	2000		Canada, CBC Northern Service	9625do			
1900	2000		Canada, CFRX Toronto ON	6070do			
1900	2000		Canada, CFVP Calgary AB	6030do			
1900	2000		Canada, CKZN St John's NF	6160do			
1900	2000		Canada, CKZU Vancouver BC	6160do			
1900	2000		Costa Rica, R for Peace Intl	15040va	21815usb		
1900	2000		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am	13750na	17645as		
1900	2000	mtwhf	Eat Guinea, Radio Africa	15185af			
1900	2000	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va		
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do		
1900	2000		Guyana, Voice of	3290do	5950do		
1900	2000	vl	Italy, IRRS	3980al	3985va		
1900	2000		Kenya, Kenya BC Corp	4885do			
1900	2000		Kuwait, Radio	11990va			
1900	2000	irreg	Liberia, ELWA	4760do			
1900	2000		Liberia, R Liberia Intl	5100do			
1900	2000		Malaysia, Radio	7295do			
1900	2000		Namibia, NBC	3270do	3290al		
1900	2000		Netherlands, Radio	6020af	9895af	11655af	13700af
1900	2000		Nigeria, Radio/Enugu	6025do			
1900	2000		Nigeria, Radio/Ibadan	6050do			
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
1900	2000		Nigeria, Radio/Lagos	3326do	4990al		
1900	2000		Nigeria, Voice of	7255af			
1900	2000	mtwhf	Papua New Guinea, NBC	4890do	9675al		
1900	2000		Russia, Voice of Russia	5940eu	5950eu	6175eu	7340eu
			9775eu	15735eu	7390eu		

1900	2000	Russia, World Beacon	3230af	17850af			
1900	2000	S Africa, African Beacon	3230af				
1900	2000	Sierra Leone, SLBS	3316do				
1900	2000	South Korea, R Korea Intl		5975om	7275eu		
1900	2000	Swaziland, TWR	3200af				
1900	2000	Thailand, Radio	7155eu				
1900	2000	Uganda, Radio	4976do	5026al	7195al		
1900	2000	UK, BBC World Service	3255af	6005af	6190af	6195eu	
		9410eu	12095eu	15310as	15400af	17830af	
1900	2000	af	UK, BBC World Service	5975as			
1900	2000	a	UK, BBC World Service	6010eu			
1900	2000		UK, World Beacon	3230af	17850af		
1900	2000		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb	10320usb	10940usb	12579usb	13362usb
1900	2000		USA, KAJI Dallas TX	13815va			
1900	2000		USA, KJES Vado NM	15385af			
1900	2000		USA, KTBN Salt Lk City UT		15590na		
1900	2000		USA, KWHR Naalehu HI	9930as			
1900	2000		USA, Voice of America	4950af	6035af	7415af	9525pa
			9690as	9760as	11870pa	11975af	13710af
			15580af	17895af	15580af	15180pa	15240af
1900	2000	mtwhf	USA, Voice of America	5965me	9840as	11720as	11970as
			15205me	15410as			
1900	2000		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na
1900	2000		USA, WEWN Birmingham AL	11550na	11530na	13615na	15745na
			17595eu				
1900	2000		USA, WHRA Greenbush ME	17650af			
1900	2000		USA, WHRI Noblesville IN	9495am	13760va		
1900	2000		USA, WINB Red Lion PA	13570am			
1900	2000		USA, WJCR Upton KY	13595am			
1900	2000		USA, WMLK Bethel PA	15265eu			
1900	2000	mtwhf	USA, WRMI Miami FL	15725na			
1900	2000		USA, WRNO New Orleans LA	7395am	15420am		
1900	2000		USA, WSHB Cypress Creek SC	15665eu	18910af		
1900	2000		USA, WTJC Newport NC	9370na			
1900	2000		USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
1900	2000		USA, WYFR Okeechobee FL	18980eu			
1900	2000	vl	Vanuatu, Radio	4960do	7260do		
1900	2000		Zambia, Christian Voice	4965af			
1900	2000	vl	Zambia, Radio ZNBC	4910do	6265al		
1930	1955		Belgium, RVI Flanders R Intl	9925eu	13690eu		
1930	2000	t h	Belarus, Radio Belarus Intl	7105eu	7210eu		
1930	2000		Georgia, Georgian Radio	11760eu			
1930	2000		Iran, VOIRI	6110eu	9890eu	11695af	15140af
1930	2000		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu
1930	2000	mtwhf/vl	Serbia & Montenegro, R Yugo	6100eu			
1930	2000		Solomon Islands, SIBC	5020do			
1930	2000		Sweden, Radio	6065va			
1930	2000		Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af
1930	2000	mtwhf	UK, BBC World Service	11720as			
1930	2000		UK, BBC World Service	17885af			
1935	1955		Italy, RAI Intl	5970eu	9475eu		
1950	2000		Vatican City, Vatican Radio		4005eu	5885eu	7250eu
1951	2000		New Zealand, Radio NZ Intl		15160pa		9645eu

2000 UTC - 4PM E / 3PM C / 1PM P

2000	2010	Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
2000	2015	s/vl	Solomon Islands, SIBC	5020do			
2000	2015	mtwhf	Swaziland, TWR	3200af			
2000	2015		UK, BBC World Service	11955eu			
2000	2025		Netherlands, Radio	6020af	9895af	11655af	13700af
2000	2029		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu
2000	2030		Iran, VOIRI	6110eu	9890eu	11695af	15140af
2000	2030	mtwhf	Lithuania, Tomorrow's Nx Today	7590eu			
2000	2030		Mongolia, Voice of	12015as			
2000	2030		S Africa, AWR Africa	17695af			

Hauser's Highlights

ALBANIA

A-02 schedule for Radio Tirana shows English now taking Sundays off, with sites, power, azimuth:

Europe - Mon to Sat

1845-1900	7210 SHI 100 kW / 310 deg
	9520 CER 100 kW / 305 deg
2130-2200	7130 SHI 100 kW / 310 deg
	9540 CER 100 kW / 305 deg

N America - UT Tue to Sun

0145-0200	6115 CER 100 kW / 305 deg
	7160 CER 100 kW / 305 deg
0230-0300	6115 CER 100 kW / 305 deg
	7160 CER 100 kW / 305 deg

But Albanian to NAm remains daily:

2300-0330	6090 SHI 100 kW / 300 deg
	7270 CER 100 kW / 305 deg

(Ivo and Angel! Observer, Bulgaria)

Shortwave Guide



2000	2030	mtwhf/vl	Solomon Islands, SIBC	5020do					
2000	2030		Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af		
2000	2030		USA, Voice of America	4950af	6035af	6095af	7415af		
			9690as9760as11855af		11975af	13710af15240af	15580af		
			17885af 17895af						
2000	2030		Vatican City, Vatican Radio	9660af	11625af	13765af			
2000	2045		Germany, Deutsche Welle	6140eu					
2000	2045		Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr			
2000	2056		China, China Radio Intl	5965eu	9440af	9840eu	13640af	15125af	
2000	2059		Canada, Radio Canada Intl	5850va	5995va	11690va11965va			
			12015va 15325va15470va						
2000	2100		Algeria, Radio Algiers Intl	11715eu	15160eu				
2000	2100		Anguilla, Caribbean Beacon	11775am					
2000	2100		Australia, ABC NT Katherine	2485do					
2000	2100		Australia, ABC NT Tennant Crk	2325do					
2000	2100		Australia, Radio	9500as	9580va	11880va			
2000	2100		Australia, Radio Christian Voice	6010as	7170as				
2000	2100	vl	Botswana, Radio	3356do	4820do	7255do			
2000	2100	irrg/vl	Cameroon, RTV	4850do					
2000	2100		Canada, CBC Northern Service	9625do					
2000	2100		Canada, CFRX Toronto ON	6070do					
2000	2100		Canada, CFVP Calgary AB	6030do					
2000	2100		Canada, CKZN St John's NF	6160do					
2000	2100		Canada, CKZU Vancouver BC	6160do					
2000	2100		Costa Rica, R for Peace Intl	15040va	21815usb				
2000	2100		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na 17645as						
2000	2100		Ecuador, HCJB	17660eu					
2000	2100	mtwhf	Eat Guinea, Radio Africa	15185af					
2000	2100	a/monthly	Finland, Scandy Weekend Radio	6170va	11690va				
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do				
2000	2100		Indonesia, Voice of	9525pa	11785af	15150as			
2000	2100	vl	Italy, IRRS	3980af					
2000	2100		Kenya, Kenya BC Corp	4885do					
2000	2100		Kuwait, Radio	11990va					
2000	2100	irreg	Liberia, ELWA	4760do					
2000	2100		Liberia, R Liberia Intl	5100do					
2000	2100		Malaysia, Radio	7295do					
2000	2100		Namibia, NBC	3270do	3290af				
2000	2100		New Zealand, Radio NZ Intl	15160pa					
2000	2100		Nigeria, Radio/Enugu	6025do					
2000	2100		Nigeria, Radio/Ibadan	6050do					
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
2000	2100		Nigeria, Radio/Lagos	3326do	4990af				
2000	2100		Nigeria, Voice of	7255af					
2000	2100		Russia, Voice of Russia	5940eu	5950eu	6175eu	7300eu	7340eu	
			7390eu 15735eu						
2000	2100		Russia, World Beacon	3230af	17850af				
2000	2100		S Africa, African Beacon	3230af					
2000	2100		Sierra Leone, SLBS	3316do					
2000	2100	mtwhf	Spain, R Exterior Espana	9690eu					
2000	2100		Uganda, Radio	4976do	5026af	7195af			
2000	2100		UK, BBC World Service	3255af	6005af	6190af	6195af		
			9410eu12095eu	15400af	17830af				
2000	2100		UK, World Beacon	3230af	17850af				
2000	2100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb	10940usb12579usb	12689usb	13362usb			
2000	2100		USA, KAJI Dallas TX	13815va					
2000	2100		USA, KJES Vado NM	15385na					
2000	2100		USA, KTBN Salt Lk City UT		15590na				
2000	2100		USA, KWHR Naalehu HI	9930as					
2000	2100		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na		
2000	2100		USA, WEWN Birmingham AL	11530na	13615na	15745na	17595eu		
2000	2100		USA, WHRA Greenbush ME	17650af					
2000	2100		USA, WHRI Noblesville IN	5745va	9495am				
2000	2100		USA, WINB Red Lion PA	13570am					
2000	2100		USA, WJCR Upton KY	13595am					
2000	2100		USA, WMLK Bethel PA	15265eu					
2000	2100	mtwhf	USA, WRMI Miami FL	15725na					
2000	2100		USA, WRNO New Orleans LA	7395am	15420am				
2000	2100		USA, WTJC Newport NC	9370na					
2000	2100		USA, WWRB Nashville TN	9475na	12160na	13845na	15685na		
2000	2100		USA, WWRB Manchester TN	9320va	9400va	12172va			
2000	2100		USA, WYFR Okeechobee FL	17725sa	17845va	18980eu			
2000	2100	vl	Vanuatu, Radio	4960do	7260do				
2000	2100		Zambia, Christian Voice	4965af					
2000	2100	vl	Zambia, Radio ZNBC	4910do	6265af				
2000	2100	vl	Zimbabwe, ZBC Corp	5975do	6045af				
2000	2100		USA, WSHB Cypress Creek SC	15665eu	18910af				
2005	2100	vl	Syria, Radio Damascus	12085eu	13610eu				
2025	2045		Italy, RAI Intl	7220af	9710af	11880af			
2030	2045	vl	Libya, Voice of Africa	15435irr	17750irr				
2030	2045		Thailand, Radio	9680eu					
2030	2057		Vietnam, Voice of	7145eu	9730eu				
2030	2100		Australia, Radio Christian Voice	11935as					
2030	2100	i	Belarus, Radio Belarus Intl	7105eu	7210eu				
2030	2100		Cuba, Radio Havana	13660usb	13750eu				
2030	2100		Ecuador, HCJB	21455usb					
2030	2100		Egypt, Radio Cairo	15375af					
2030	2100		S Africa, AWR Africa	15295af					
2030	2100	vl	Solomon Islands, SIBC	5020do					
2030	2100		Turkey, Voice of	9525va					
2030	2100		UK, BBC World Service	3390af	6135as				
2030	2100	f	UK, Wales Radio Intl	7325eu					
2030	2100		USA, Voice of America	6035af	6095as	7415af			
			9690as9760as11975af		13710af	15240af15580af	17885af		
			17895af						

2030	2100	as	USA, Voice of America	4950af					
2030	2100		Uzbekistan, Radio Tashkent	5025eu	7105eu	11905eu			
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu				
2045	2100		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu	
			11715au						

2100 UTC - 5PM E / 4PM C / 2PM P

2100	2129		Canada, Radio Canada Intl	5850va	7235va	13690va	15325va
			17870va				
2100	2130		Australia, ABC NT Katherine	2485do			
2100	2130		Australia, ABC NT Tennant Crk	2325do			
2100	2130		Australia, Radio	7240pa	9500as	9580va	11880va
			12080pa 17715va 21740va				
2100	2130		Australia, Radio Christian Voice	11935as			
2100	2130		China, China Radio Intl	5965eu	9840eu	9845eu	13640af
2100	2130		Cuba, Radio Havana	13660usb	13750eu		15125af
2100	2130		Hungary, Radio Budapest	3975eu	6025eu		
2100	2130		Kenya, Kenya BC Corp	4885do			
2100	2130		Mexico, Radio Mexico Intl	9705am	11770am		
2100	2130		Nigeria, Radio/Ibadan	6050do			
2100	2130		Turkey, Voice of	9525va			
2100	2145		Germany, Deutsche Welle	9765as	9770pa	9875af	11865af
			11915as 15135va				
2100	2145		USA, WYFR Okeechobee FL	18980eu			
2100	2156		North Korea, Voice of	7505eu	11335eu		
2100	2157		Czech Rep, Radio Prague Intl	5930va	9430va		
2100	2200		Anguilla, Caribbean Beacon	11775am			
2100	2200		Austria, AWR Europe	15355af			
2100	2200	vl	Botswana, Radio	3356do	4820do		
2100	2200		Bulgaria, Radio	5800eu	7500eu		
2100	2200	irrg/vl	Cameroon, RTV	4850do			
2100	2200		Canada, CBC Northern Service	9625do			
2100	2200		Canada, CFRX Toronto ON	6070do			
2100	2200		Canada, CFVP Calgary AB	6030do			
2100	2200		Canada, CKZN St John's NF	6160do			
2100	2200		Canada, CKZU Vancouver BC	6160do			
2100	2200		Costa Rica, R for Peace Intl	15040va	21815usb		
2100	2200		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am 13750na 17645as				
2100	2200		Ecuador, HCJB	17660eu	21455usb		
2100	2200		Egypt, Radio Cairo	15375af			
2100	2200	mtwhf	Eqt Guinea, Radio Africa	15185af			
2100	2200	f/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do		
2100	2200		Guyana, Voice of	3290do	5950do		
2100	2200		India, All India Radio	7150va	7410eu	9650au	9910au
			11715au			11620eu	
2100	2200	vl	Italy, IRRS	3980af	3985va		
2100	2200		Japan, Radio6115eu	6180eu	11850as	11855af	11920as
			21670pa				17825pa
2100	2200	irreg	Liberia, ELWA	4760do			
2100	2200		Liberia, R Liberia Intl	5100do			
2100	2200		Malaysia, Radio	7295do			
2100	2200		Namibia, NBC	3270do	3290af		
2100	2200		New Zealand, Radio NZ Intl	15160pa			
2100	2200		Nigeria, Radio/Enugu	6025do			
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
2100	2200		Nigeria, Radio/Lagos	3326do	4990af		
2100	2200		Palau, KHBV/VO Hope	9985as			
2100	2200	mtwhfa	Papua New Guinea, NBC	4890do	9675af		
2100	2200		Romania, R Romania Intl	5955eu	7105eu	7215eu	9690eu
2100	2200		Russia, World Beacon	3230af	17850af		
2100	2200		S Africa, African Beacon	3230af			
2100	2200		Sierra Leone, SLBS	3316do			
2100	2200	vl	Solomon Islands, SIBC	5020do			
2100	2200		South Korea, R Korea Intl	15575eu			
2100	2200	vl	Syria, Radio Damascus	12085eu	13610eu		
2100	2200		UK, BBC World Service	3255af	3915as	5975am	6005af6190af
			6195eu 9410eu 12095af	15400af			
2100	2200		UK, World Beacon	3230af	17850af		
2100	2200		Ukraine, R Ukraine Intl	5930eu	6020eu	9950eu	11705eu
2100	2200		USA, Armed Forces Network	4319usb	4993usb	5765usb	11950eu
			6458usb 10320usb 10940usb1	12579usb	12689usb	1362usb	6350usb
2100	2200		USA, KAUJ Dallas TX	13815va			
2100	2200		USA, KBTN Salt Lk City UT	15590na			
2100	2200		USA, KWHR Naalehu HI	9930as			
2100	2200		USA, Voice of America	6035af	6040me	6095as	6160as7140me
			7415af 9530me 9595as9670as		9760me	11870pa11975af	
			13710af 15185pa 15240af	15580af	17735as	17820as	17895af
2100	2200		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na	17495na
2100	2200		USA, WEWN Birmingham AL	11530na	13615na	15475na	17595eu
2100	2200		USA, WHRA Greenbush ME	17650af			
2100	2200		USA, WHRI Noblesville IN	5745va	9495am		
2100	2200		USA, WINB Red Lion PA	13570am			
2100	2200		USA, WJCR Upton KY	13595am			
2100	2200		USA, WMLK Betel PA	15265eu			
2100	2200	smtwhf	USA, WRMI Miami FL	15725na			
2100	2200		USA, WRNO New Orleans LA	7395am	15420am		
2100	2200		USA, WSHB Cypress Creek SC	15665eu	18910af		
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
2100	2200		USA, WWRB Manchester TN	9320va	9400va	12172va	
2100	2200		USA, WYFR Okeechobee FL	15120af	17725sa	17845va	
2100	2200	vl	Vanuatu, Radio	4960do	7260do		

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2100	2200		Zambia, Christian Voice	4965af					
2100	2200	vl	Zambia, Radio ZNBC	4910do	6265al				
2100	2200	vl	Zimbabwe, ZBC Corp	5975do	6045al				
2115	2130	mtwhf	UK, BBC World Service	11675va					
2115	2200		Egypt, Radio Cairo	9990eu					
2130	2156		China, China Radio Intl	5965eu	9840eu				
2130	2200	mtwhf	Albania, Radio Tirana Intl	7130eu	9540eu				
2130	2200		Australia, ABC NT Alice Springs	4835do					
2130	2200		Australia, ABC NT Katherine	5025do					
2130	2200		Australia, ABC NT Tennant Crk	4910do					
2130	2200		Australia, Radio	7240pa	9660pa	11880va	12080pa	17715va	
			21740va						
2130	2200	mtwhf	Austria, Radio Austria Intl	5945va	6155va				
2130	2200		Guam, AWR11960as	11980as					
2130	2200		Iran, VOIRI 9780au	11740au					
2130	2200		Sweden, Radio	6065va	15255va				
2130	2200		Uzbekistan, Radio Tashkent	5025eu	7105eu	11905eu			

2200 UTC - 6PM E / 5PM C / 3PM P

2200	2205	vl	Syria, Radio Damascus	12085eu	13610eu				
2200	2215		New Zealand, Radio NZ Intl	15160pa					
2200	2229		Canada, Radio Canada Intl	6175am	9590am	11920am	13670am		
			15305am 17695am	17880am					
2200	2230		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu	
			11715au						
2200	2230		Iran, VOIRI 9780au	11740au					
2200	2230	mtwhf	Mexico, Radio Mexico Intl	9705am	11770am				
2200	2230		Serbia & Montenegro, R Yugo	6100eu					
2200	2230		South Korea, R Korea Intl	3955eu					
2200	2230		USA, KWHR Naalehu HI	9930as					
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	11655af	11975af	13710af	
2200	2230	vl	Zambia, Radio ZNBC	4910do	6265al				
2200	2230	vl	Zimbabwe, ZBC Corp	5975do	6045al				
2200	2245		Egypt, Radio Cairo	9990eu					
2200	2245		USA, WYFR Okeechobee FL	15695eu	17845va				
2200	2256		China, China Radio Intl	7170eu					
2200	2300		Anguilla, Caribbean Beacon	6090am					
2200	2300		Australia, ABC NT Alice Springs	4835do					
2200	2300		Australia, ABC NT Katherine	5025do					
2200	2300		Australia, ABC NT Tennant Crk	4910do					
2200	2300		Australia, Radio	13620va	17715va	17795va	21740va		
2200	2300		Australia, Radio Christian Voice	13620as					
2200	2300	irrgr/vl	Cameroon, RTV	4850do					
2200	2300		Canada, CBC Northern Service	9625do					
2200	2300		Canada, CFRX Toronto ON	6070do					
2200	2300		Canada, CFVP Calgary AB	6030do					
2200	2300		Canada, CKZN St John's NF	6160do					
2200	2300		Canada, CKZU Vancouver BC	6160do					
2200	2300		Costa Rica, R for Peace Intl	15040va	21815usb				
2200	2300		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na 17645as						
2200	2300	mtwhf	Eat Guinea, Radio Africa	15185af					
2200	2300	f/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do				
2200	2300		Guyana, Voice of	3290do					
2200	2300		Italy, IRRS 3980al	3985va					
2200	2300		Liberia, R Liberia Intl	5100do					
2200	2300		Malaysia, Radio	7295do					
2200	2300		Namibia, NBC	3270do	3290al				
2200	2300		Nigeria, Radio/Enugu	6025do					
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do	9570do			
2200	2300		Nigeria, Radio/Lagos	3326do					
2200	2300		Palau, KHBN/VO Hope	9965as	9985as				
2200	2300		Sierra Leone, SLBS	3316do					
2200	2300	vl	Solomon Islands, SIBC	5020do					
2200	2300	as	Spain, R Exterior Espana	9595va					
2200	2300		Taiwan, R Taipei Intl	5810eu	9335eu				
2200	2300		Turkey, Voice of	7270va	11960va	11655va			
2200	2300		UK, BBC World Service	3915as	5975am	6195as 7160as 9580eu			
			9740as 11685as 11945as	12095af	15400af				
2200	2300		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb			
2200	2300		USA, KAIJ Dallas TX	13815va					
2200	2300		USA, KTBN Salt Lk City UT	15590na					
2200	2300		USA, Voice of America	6160as	7215as	7290me 9530me	9770as		
			9880as 9890as 11760as	15185as	15290as 15305as		17735as		
			17820as						
2200	2300		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na			
2200	2300		USA, WEWN Birmingham AL	9975eu	11530na	15745na	17595eu		
2200	2300		USA, WHRA Greenbush ME	17650af					
2200	2300		USA, WHRI Noblesville IN	5745va	9495am				
2200	2300		USA, WINB Red Lion PA	13570am					
2200	2300		USA, WJCR Upton KY	13595am					
2200	2300	smthwhf	USA, WRMI Miami FL	15725na					
2200	2300		USA, WRNO New Orleans LA	7395am	15420am				
2200	2300		USA, WSHB Cypress Creek SC	13770eu	15285sa				
2200	2300		USA, WTJC Newport NC	9370na					
2200	2300		USA, WWCN Nashville TN	7435na	9475na	12160na	13845na		
2200	2300		USA, WWRB Manchester TN	6890va	9320va	9400va	12172va		
2200	2300		USA, WYFR Okeechobee FL	11740na					
2200	2300	vl	Vanuatu, Radio	4960do	7260do				
2200	2300		Zambia, Christian Voice	4965af					
2205	2230		Italy, RAI Intl	9675as	11900as				
2205	2300	mtwhf	Spain, R Exterior Espana	9690eu					
2216	2300		New Zealand, Radio NZ Intl	17675pa					

2300 UTC - 7PM E / 6PM C / 4PM P

2230	2255		Belgium, RVI Flanders R Intl	15565na					
2230	2257		Czech Rep, Radio Prague Intl	7345na	9435af				
2230	2300		Canada, Radio Canada Intl	6175na	9590na	13670na	17695na		
2230	2300		Cuba, Radio Havana	9550am					
2230	2300		UK, BBC World Service	11765af	15390am				
2245	2300		India, All India Radio	9705as	9950as	13605as			
2300	0000		Anguilla, Caribbean Beacon	6090am					
2300	0000		Australia, ABC NT Alice Springs	4835do					
2300	0000		Australia, ABC NT Katherine	5025do					
2300	0000		Australia, ABC NT Tennant Crk	4910do					
2300	0000		Australia, Radio	9660pa	12080pa	13620va	15240as	17715va	
			17795va 21740va						
2300	0000		Australia, Radio Christian Voice	11935as					
2300	0000		Bulgaria, Radio	7400na	9400na				
2300	0000irrgr/vl		Cameroon, RTV	4850do					
2300	0000		Canada, CBC Northern Service	9625do					
2300	0000		Canada, CFRX Toronto ON	6070do					
2300	0000		Canada, CFVP Calgary AB	6030do					
2300	0000		Canada, CKZN St John's NF	6160do					
2300	0000		Canada, CKZU Vancouver BC	6160do					
2300	0000		Costa Rica, R for Peace Intl	15040va	21815usb				
2300	0000		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na 17645as						
2300	0000		Egypt, Radio Cairo	9900na					
2300	0000	f/monthly	Finland, Scandv Weekend Radio	6170va	11690va				
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do				
2300	0000		Guyana, Voice of	3290do					
2300	0000		India, All India Radio	9705as	9950as	13605as			
2300	0000	fas	Italy, IRRS 7120va	7125al					
2300	0000		Liberia, R Liberia Intl	5100do					
2300	0000		Malaysia, Radio	7295do					
2300	0000		Namibia, NBC	3270do	3290al				
2300	0000		New Zealand, Radio NZ Intl	17675pa					
2300	0000		Palau, KHBN/VO Hope	9965as	9985as				
2300	0000		Romania, R Romania Intl	7195eu	9510na	9570eu	11940na		
2300	0000		Sierra Leone, SLBS	3316do					
2300	0000		Singapore, SBC Radio One	6150do					
2300	0000		UK, BBC World Service	5975am	6195as	11685as	12095af		
2300	0000		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb		
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb			
2300	0000		USA, KAIJ Dallas TX	13815va					
2300	0000		USA, KTBN Salt Lk City UT	15590na					
2300	0000		USA, Voice of America	6160as	7215as	7290me 9530me	9770me		
			9880as 9890as 11760as	15185as	15290as 15305as		17735as		
			17820as						
2300	0000		USA, WBCQ Kennebunk, ME	7415na	9335na	11660na			
2300	0000		USA, WEWN Birmingham AL	9355na	9975eu	11530na	17595eu		
2300	0000		USA, WHRA Greenbush ME	7580eu					
2300	0000		USA, WHRI Noblesville IN	5745va	9495am				
2300	0000		USA, WINB Red Lion PA	13570am					
2300	0000		USA, WJCR Upton KY	13595am					
2300	0000		USA, WRMI Miami FL	15725na					
2300	0000		USA, WRNO New Orleans LA	7355am					
2300	0000		USA, WSHB Cypress Creek SC	13770va	15285sa				
2300	0000	as	USA, WTJC Newport NC	9370na					
2300	0000		USA, WWBS Macon GA	11900na					
2300	0000		USA, WWCN Nashville TN	5070na	7435na	9475na	13845na		
2300	0000		USA, WWRB Manchester TN	6890va	9320va	9400va	12172va		
2300	0000		USA, WYFR Okeechobee FL	5895na	11855na	15255sa	17750am		
2300	0000	vl	Vanuatu, Radio	4960do	7260do				
2300	0000		Vanuatu, Radio	4960do	7260do				
2300	0000		Zambia, Christian Voice	4965af					
2300	2330		Cuba, Radio Havana	9550am					
2300	2330		Nigeria, Radio/Enugu	6025do					
2300	2330		Nigeria, Radio/Kaduna	4770do	6090do				
2300	2330		Nigeria, Radio/Lagos	3326do	4990al				
2300	2330	vl	Solomon Islands, SIBC	5020do					
2300	2330		UK, BBC World Service	9580eu					



Note: Additional listings for **BBC World Service** reflect projected best times for hearing alternative streams. A higher quality receiver with use of an external antenna will be necessary for listenable reception and, even then, only when conditions are favorable. In general, Asian streams are the better bet on the west coast; other streams on the east coast.

[BBC stream abbreviations: (am)=Americas; (eu)=Europe/N. Africa; (me)=Middle East, SW Asia, CIS (former Soviet Union); (wcaf)=West and Central Africa; (esaf)=East and Southern Africa; (af)=both (wcaf) and (esaf); (sas)=South Asia; (eas)=East Asia.]

0000 UTC/ 8pm E/5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBC(am)	S/M	World Briefing*
		T-A	News
	BBC(eas)(sas)	D	World Briefing*
	R. Australia	D	News
	R. Japan	D	World News
	R. New Zealand Int.	S/A	News
		M-F	Midday Report*
		D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	World News
0010	VOA News Now	T-A	Regional News
0014	VOA News Now	T-A	USA News
0030	BBC(am)	M	The World Today*
	BBC(sas)	M-F	The World Today*
	VOA News Now	T-A	World News

CURRENT AFFAIRS/FEATURES

0010	R. Australia	W	The National Interest
		H	Background Briefing (documentaries)
0015	R. Japan	T-A	44 Minutes
0030	BBC(am)(eu)(sas)	S	Agenda (trends)
0033	VOA News Now	T	Encounter
		F	Best of "Talk to America"
		A	Press Conference USA
0045	BBC(eas)	M	Letter from America
		TVFA	Analysis (one issue)
		H	From Our Own Correspondent

Business/Economics (also in NEWSCASTS & Current Affairs)

0000	R. Netherlands	A	A Good Life (development issues)
0028	HCIB	T-A	Money Minute
0020	R. Prague	F	Economic Report
0030	BBC(eas)	M	World Business Review
		T-A	World Business Report
	R. Netherlands	W	A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0000	R. Netherlands	T	Research File
0010	R. Australia	T	The Science Show
0030	R. Netherlands	F	Research File
0033	VOA News Now	W	Our World
0034	R. Australia	S	Ockham's Razor

ARTS & CULTURE

0000	R. Netherlands	F	Aural Tapestry
0005	BBC(am)	T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
	R. Prague	S	Readings from Czech Literature
0010	R. Australia	M	Away! (Aboriginal culture)
	R. Prague	M	The Arts
0030	R. Netherlands	M	Aural Tapestry
0033	VOA News Now	H	Kaleidoscope

LOCAL LIVES & VIEWS

0000	R. Netherlands	M	Dutch Horizons
	YLE R. Finland	M	Capital Weekend
0005	R. Prague	M	Letter from Prague
		T-A	Current Affairs
0010	R. Australia	F	Hindsight (Australian history)
	R. Japan	M	Weekend Square
	R. New Zealand Int.	S	This Week in Parliament
		A	Focus on Politics
0015	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today

0020	R. Prague	M	From the Weeklies
0030	R. Australia	A	Country Breakfast (rural life)
	R. Netherlands	S	Roughly Speaking (Euro youth)
		T	Euroquest (Europe in context)
		H	Dutch Horizons
	R. New Zealand Int.	S	Spectrum (life in NZ)

INFORMATIONAL FEATURES

0000	R. Netherlands	H	Documentary
0005	R. Australia	S	The Europeans
0022	VOA News Now	T-A	Feature story
0030	BBC(sas)	A	Reporting Religion
	R. Netherlands	A	Documentary
0047	Spanish Foreign R.	T-A	Spanish Language Course
Music			
0000	R. Netherlands	S/W	Music 52-15 (world/folk)
	WBCQ(7415kHz)	S	Different Kind of Oldies Show
		M	Radio New York International
	WWCR(3210kHz)	S	Big Backyard (Australian country)
	BBC(am)	F	The Music Biz (the industry)
0005	R. Prague	S	Saturday Music (classical/folk/jazz)
0010	BBC(am)	T	Charlie Gillett (world)
0030		W	UK Top 20 (pop/rock)
		H	Revolver (artist selections)
		F	John Peel (eclectic)
		A	Jazzmatazz
	R. New Zealand Int.	A	The Sampler (latest CDs)

SWL, MEDIA, COMMUNICATIONS

0000	WBCQ(7415kHz)	W	Off the Hook (computer hacking)
		A	Allan Weiner Worldwide (station manager)
	WHRI(5745kHz)	S	Dixing with Cumbre
0047	Spanish Foreign R.	A	Radio Waves

LISTENER CONTACT/INTERACTIVE

0005	R. Australia	A	Feedback
0010	R. Japan	S	Hello from Tokyo
0015	R. Prague	A	Mailbox
0030	HCIB	S	Saludos Amigos
0035	Spanish Foreign R.	A	Radio Club
0047	Spanish Foreign R.	M	Radio Club (rpt.)

SPORT

0018	VOA News Now	S/A	Sports
0020	BBC(am)	S/M	Sports Roundup
	BBC(sas)	D	Sports Roundup

0100 UTC/ 9pm E/6pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBC(am)(eu)	S	The World Today*
		M-A	News
	BBC(sas)	D	The World Today*
	China R. Int.	D	News
	Deutsche Welle	D	News
	HCIB	T-A	Latin American & World News
	R. Australia	D	News
	R. Budapest	D	News
	R. Canada Int.	T-A	News
	R. Habana Cuba	D	International News
	R. Netherlands	S/M	News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	World News
	Voice of Russia	D	News
	Voice of Vietnam	D	News
0110	R. Habana Cuba	T-S	National News
	VOA News Now	T-A	Regional News
0114	VOA News Now	T-A	USA News
0130	R. Habana Cuba	T-S	News Bulletin
	RTE, Ireland	T-S	The News at Six*
	VOA News Now	T-A	World News
	VOA Spec. Eng.	T-A	News
	Voice of Russia	D	News

CURRENT AFFAIRS/FEATURES

0100	R. Netherlands	T-A	Newsline
0105	BBC(eas)	T-A	Outlook
	Deutsche Welle	M	Talking Point (journalists)
		T-A	Newslink
	R. Australia	S	Correspondents' Report
	R. Australia	A	Asia Pacific
	R. Netherlands	M	Wide Angle
0110	China R. Int.	M-F	Current Affairs
	R. Australia	M-F	Asia Pacific
	R. Habana Cuba	M	Weekly Review
0111	Voice of Russia	S	News and Views
		M	Sunday Panorama
		T-A	Commonwealth Update

0115	R. Habana Cuba	T-S	Viewpoint
0130	BBC(sas)	S	Assignment (in-depth)
	Deutsche Welle	T	Insight
	R. Austria Int.	D	Report from Austria
0135	R. Canada Int.	S/A	Canada in the World
		T	Media Zone
		T-F	Dateline
0136	VOA News Now	T-F	Weekly Review
0140	R. Habana Cuba	A	In the News
	VOA Spec. Eng.	A	

BUSINESS/ECONOMICS

0105	R. Canada Int.	S	Business Sense
0110	R. Budapest	M	Europe Unlimited (trade-biweekly)
0115	China R. Int.	S	Reports on Developing Countries
		A	Biz China
		F	Economic Report
0120	R. Prague	W	China Horizons
0130	China R. Int.	F	Business Sense
0135	R. Canada Int.	F	Business Sense
0149	VOA News Now	T-F	Business News

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0105	BBC(am)	T	Health Matters
		W	Go Digital (technology)
		H	Discovery (research)
		F	One Planet (ecology)
		A	Science in Action (magazine)
0130	Deutsche Welle	W	Man and Environment
	R. Australia	M	The Health Report
0140	VOA Spec. Eng.	W/H	Agriculture Today
		F	Science Report
		T-F	Environment Report
0145	VOA News Now	T	Science in the News
	VOA Spec. Eng.	W	Explorations
0150	R. Habana Cuba	M	Breakthrough

ARTS & CULTURAL

0105	R. New Zealand Int.	S	At the Movies
	R. Prague	S	Readings from Czech Literature
0110	R. Budapest	M	Spotlight (monthly)
	R. Prague	M	The Arts
0115	Deutsche Welle	M	Arts on the Air
0120	China R. Int.	S	In the Spotlight
0130	R. Australia	A	Arts with Julie Copeland
	R. New Zealand Int.	S	Bookmarks
0135	R. Canada Int.	M/H	Spotlight
0145	VOA Spec. Eng.	A	American Stories
		H	The Making of a Nation

LOCAL LIVES & VIEWS

0105	R. Canada Int.	T-A	Canada Today
	R. Netherlands	S	Europe Unzipped
	R. Prague	M	Letter from Prague
		T-A	Current Affairs
	Voice of Vietnam	D	Current Affairs
0110	HCIB	T-A	Studio 9 (Latin America)
	R. Budapest	M	Heading for Hungary (monthly)
		T-A	Hungary Today
0115	Deutsche Welle	S	Inside Europe
	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Czechs in History or Central Europe Today
0120	R. Prague	W	Talking Point
		A	From the Weeklies
0124	Voice of Russia	M	Russia: People and Events
0130	BBC(eas)	S	In Praise of God (worship service)
	BBC(sas)	A	People and Politics
	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
0132	Voice of Russia	S	Moscow Yesterday and Today
0140	R. Austria Int.	M	Network Europe
	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	BBC(am)	S	Letter from America
	VOA Spec. Eng.	F	American Mosaic
0154	Voice of Russia	H	Russia: People and Events

INFORMATIONAL FEATURES

0105	Deutsche Welle	M	Religion and Society
0115	Deutsche Welle	A	German by Radio
0122	VOA News Now	T-A	Feature report
0130	BBC(am)	T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	People and Places
		A	At the Edge of Asia (about S. Korea/Japan)
	China R. Int.	H	Voices from Other Lands
	R. Australia	T	The Law Report
		W	The Religion Report
0132	Voice of Russia	A	Christian Message from Moscow
0145	BBC(eas)	A	Patterns of Faith
0147	Spanish Foreign R.	T-A	Spanish Language Course

Shortwave Guide



0154 VOA News Now T-F Feature report

MUSIC

0105 R. New Zealand Int. M-F Cadenza (light classics)
A Home Grown (NZ music/performers)
0110 R. Prague S Saturday Music (classical/folk/jazz)
0110 HCIB A Musica del Ecuador (within "Studio 9")
0130 BBC(am) S Music Review (magazine)
R. Australia S Oz Sounds
R. New Zealand Int. S Musical Chairs (featured artist)
0132 Voice of Russia T Folk Box
W Jazz Show
H Musical Portraits
F Yours for the Asking
0146 Voice of Russia F Music At Your Request

ENTERTAINMENT/DRAMA/VARIETY

0100 WBCQ(7415kHz) S Marion's Attic (vintage recordings)
A Tasha Takes Control
0105 BBC(am) M Wright Around the World (pop requests)
0110 Voice of Vietnam S Sunday Show
0132 Voice of Russia M Timelines
0145 BBC(eas) M-F Off the Shelf (book readings)

SWL, MEDIA, COMMUNICATIONS

0100 HCIB S DX Partyline
0105 R. Canada Int. M CDX Report (biweekly)
0110 R. Budapest S DX Blockbuster
0120 HCIB H Ham Radio Today (within "Studio 9")
0130 R. Australia H The Media Report
0135 R. Canada Int. W CDX Report (biweekly)
0140 R. Habana Cuba S/W DXers Unlimited
0145 WWCRC(5070 kHz.) S Ask WWCRC
0147 Spanish Foreign R. S Radio Waves

LISTENER CONTACT/INTERACTIVE

0100 R. Canada Int. M Maple Leaf Mailbag
HCIB M Musical Mailbag
0110 R. Budapest M And the Gatepost (monthly)
R. Prague A Mailbox
0115 Voice of Vietnam H Letterbox
0120 China R. Int. A Listeners' Garden
0130 HCIB S Musical Mailbag
0135 R. Canada Int. W Maple Leaf Mailbag
Spanish Foreign R. A Radio Club
0140 R. Habana Cuba M Mailbag Show
Swiss R. Int. S Capital Letters (2nd/4th wk.)
0145 R. Austria Int. S Listeners' Letters
0147 Spanish Foreign R. M Radio Club

SPORT

0115 Deutsche Welle F Hard to Beat: The World of SPORT
0118 VOA News Now T-A Sports Report
0130 BBC(am) H Sports International (magazine)
China R. Int. T Sports World
R. Australia F The Sports Factor
RTE Ireland S/M Sportsnews
0135 R. Habana Cuba T-A Time Out

0200 UTC/ 10pm E/7pm P - Page 43 Freqs

NEWSCASTS (*extended)

0200 BBC(am)(sas)(me)(esaf) D The World Today*
BBC(eas) S/A The World Today*
M-F News
R. Australia D News
R. Habana Cuba D International News
R. Korea Int. D News
R. New Zealand Int. D News
R. Taipei Int. D News
Voice of Russia D News
0210 R. Habana Cuba T-S National News
0230 R. Budapest D News
R. Habana Cuba T-S News Bulletin
Voice of Russia D News in Brief
Voice of Vietnam D News

CURRENT AFFAIRS/FEATURES

0210 R. Australia M-F The World Today
0215 R. Korea Int. T-A Seoul Calling
0230 BBC(am) M Assignment (in-depth)
BBC(eas)(sas)(me)(esaf) S From Our Own Correspondent
R. Sweden T-A 60 Degrees North
0245 BBC(am) TWFS Analysis (one issue)
H From Our Own Correspondent

Business/Economics

0211 Voice of Russia W/A Newmarket
0230 BBC(am) S World Business Review

BBC(sas)(me)(esaf) T-A World Business Report
0240 R. Budapest A Global Business
0245 R. Sweden M Europe Unlimited (trade-monthly)
H Money Matters

SCIENCE/TECHNOLOGY(inc. Health & Environment)

0200 WBCQ(7415kHz) S Pocket Calculator (consumer electronics)
0205 R. New Zealand Int. S Eureka!
0211 Voice of Russia T/F Science and Engineering
0230 R. Australia A Earthbeat (environment)
0245 R. Sweden F Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)

ARTS & CULTURAL

0205 BBC(eas) M Meridian-Masterpiece (ideas)
T Meridian-Screen (cinema)
W Meridian-Writing (books)
F Arts in Action (global)
0215 R. Taipei Int. T Culture Express
0230 R. Sweden S Spectrum (3rd wk.)
0240 R. Budapest M Spotlight (monthly)

LOCAL LIVES & VIEWS

0215 R. Taipei Int. W Taiwan Today
F Taipei Magazine
0230 R. Korea Int. S Figure of the Week
R. Sweden W Korean Kaleidoscope
S Weekend (Europe magazine-1st wk.)
Sweden Today (2nd wk.)
Studio 49 (topical discussion-4th wk.)
Voice of Vietnam D Current Affairs
0232 Voice of Russia M This is Russia
T Kaleidoscope
H Moscow Yesterday and Today
0235 R. Budapest M Heading for Hungary
T-A Hungary Today
0245 R. Sweden F Nordic Report (1st wk.)
The S-Files (things Swedish-4th wk.)
A Review of the Newsweek
R. Taipei Int. A Kaleidoscope (life in Taiwan)

INFORMATIONAL FEATURES

0205 R. Australia A Background Briefing (documentary)
0215 R. Taipei Int. S Great Wall Forum (mainland issues)
0232 Voice of Russia F Russian by Radio
0235 R. Habana Cuba S The World of Stamps
0245 R. Taipei Int. M-A Let's Learn Chinese

MUSIC

0205 BBC(eas) H The Music Biz (industry)
R. New Zealand Int. M-F Wayne's Music
A Home Grown (from 0105)
0206 R. New Zealand Int. M-F Wayne's Music (personal selections)
0210 R. Habana Cuba M From Habana
R. Korea Int. M Korean Pop Interactive (requests)
0215 R. Taipei Int. M Jade Bells and Bamboo Pipes (traditional)
0230 BBC(eas) M Charlie Gillett (world)
T UK Top 20 (pop/rock)
W Revolver (artist selection)
H John Peel (eclectic)
F Jazzmatazz
A Music Review (magazine)
R. Habana Cuba M The Jazz Show or Top Tens
R. Korea Int. A Notes of Nostalgia (traditional)
R. Sweden M Sounds Nordic (exc. 1st wk.)
0232 Voice of Russia S Songs from Russia
W Musical Portraits

ENTERTAINMENT/DRAMA/VARIETY

0205 R. Australia S Margaret Thrashby Interview
WWCR(3210kHz) M Golden Age of Radio Theatre
0232 Voice of Russia A Audio Book Club

SWL, MEDIA, COMMUNICATIONS

0230 R. Korea Int. M Multiwave Feedback
WWCR(5070kHz) S World of Radio
0240 R. Budapest S DX Blockbuster

LISTENER CONTACT/INTERACTIVE

0211 Voice of Russia S/M/H Moscow Mailbag
0230 R. Korea Int. S From Us to You
R. Sweden M In Touch with Stockholm (1st wk.)
R. Taipei Int. S Mailbag Time
0240 R. Budapest M And the Gatepost
0246 Voice of Russia S You Write to Moscow

SPORT

0205 R. Australia S/A Grandstand (live sports action*)
0230 R. Korea Int. H Sport
0235 R. New Zealand Int. S/A Live Sport (in season)
0245 R. Sweden T Sportsman
(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0300 UTC/ 11pm E/8pm P - Page 44 Freqs

NEWSCASTS (*extended)

0300 BBC(am) S/M World Briefing*
T-A News
BBC(me)(af) D World Briefing*
BBC(eas) S World Briefing*
M-A News
D News
China R. Int. D News
Deutsche Welle D News
R. Australia D News
R. Habana Cuba D International News
R. New Zealand Int. S/A News
M-F Pacific Regional News
D News
R. Prague D News
R. Taipei Int. D News
Voice of Russia D News
0310 R. Habana Cuba T-S National News
0330 R. Habana Cuba D News Bulletin
Voice of Russia D News in Brief
Voice of Vietnam D News

CURRENT AFFAIRS/FEATURES

0305 Deutsche Welle S/M Weekend Review
T-A Newslink
0310 China R. Int. M-F Current Affairs
R. Habana Cuba M Weekly Review
0311 Voice of Russia M Sunday Panorama
T-A News & Views
0315 R. Habana Cuba T-S Viewpoint
0330 BBC(am) M-F Network Africa
Deutsche Welle T Insight (international affairs)
R. New Zealand Int. F Pacific Correspondent
R. Sweden T-A 60 Degrees North
R. Taipei Int. S Asia Pacific (from R. Australia)
0340 R. Habana Cuba T/F Caribbean Outlook
A Weekly Review
0345 BBC(me) TWFA Analysis
H From Our Own Correspondent

BUSINESS/ECONOMICS

0315 China R. Int. S Report on Developing Countries
A Biz China
R. Taipei Int. M Taiwan Economic Journal
R. Prague F Economic Report
0320 BBC(me) M World Business Review
0330 T-A World Business Report
W China Horizons
R. New Zealand Int. W Tradewinds
R. Sweden H Money Matters

SCIENCE/TECHNOLOGY(inc. Health & Environment)

0305 BBC(eas) M One Planet (ecology)
T Science in Action (magazine)
W Health Matters
H Go Digital (technology)
F Discovery (research)
0315 Deutsche Welle S Spectrum
0330 BBC(me) S Science in Action
Deutsche Welle W Man and Environment
R. Australia S All in the Mind (the human brain)
0345 R. Sweden F Greenscan (ecology-2nd wk.)
Heartbeat (health-3rd wk.)
0350 R. Habana Cuba M Breakthrough

ARTS & CULTURE

0305 R. Prague S Readings from Czech Literature
0310 R. Prague M The Arts
0315 Deutsche Welle M Arts on the Air
R. Taipei Int. T Culture Express
0320 China R. Int. S In the Spotlight
0330 BBC(am) F Chance to Dance (ballet school)
HCIB F The Book & the Spade (religion & archaeology)
R. Sweden S Spectrum (3rd wk.)
Voice of Russia W/F Russian history/culture program

LOCAL LIVES & VIEWS

0305 R. Australia A Rural Reporter (outback)
R. New Zealand Int. W Pacific Report
F Dateline Pacific
A Tagata o te Moana (Pacific magazine)
R. Prague M Letter from Prague
T-A Current Affairs
0315 R. Prague T Spotlight (Czech current events) or One on One (interview)
H Czechs in History or Central Europe Today
0320 R. Australia M-F Pacific Focus
R. Prague W Talking Point
A From the Weeklies
0324 Voice of Russia M Russia: People and Events
0330 BBC(am) S Postmark Africa

Shortwave Guide



	A	This Week and Africa or African Quiz
China R. Int.	M	People in the Know
	F	Life in China
Deutsche Welle	H	Living in Germany
R. Sweden	S	Weekend (Europe magazine-1st wk.)
		Sweden Today (2nd wk.)
		Studio 49 (topical discussion-4th wk.),
	H	Life Unusual
R. Taipei Int.	S	Kaleidoscope (Russian events)
0332 Voice of Russia	F	Nordic Report (1st wk.)
0345 R. Sweden		The S-Files (things Swedish-4th wk.)
	A	Review of the Newswave

INFORMATIONAL FEATURES

0315 R. Taipei Int.	S	Great Wall Forum (mainland issues)
0320 China R. Int.	H	Voices from Other Lands
0330 BBC(am)(me)	S	Reporting Religion
BBCWS(am)	T	What is Civil Society?
	H	Stolen Lives (tragedy)
	A	Patterns of Faith
BBC(eas)	S	Reporting Religion
	M	People and Places
	T	At the Edge of Asia (about S. Korea/Japan)
	W	Everywoman (magazine)
	H	Omnibus (documentaries)
Deutsche Welle	A	German by Radio
0332 R. Australia	A	Time to Talk (Pacific island nations)
Voice of Russia	T/H/S	20th Century
0345 BBC(me)	M	Patterns of Faith

MUSIC

0300 HCIB	S	Inspirational Classics
WBCQ(7415kHz)	S	Zombo's Mondo Record Party (eclectic)
0305 BBC(am)	T	Jazzmatazz
	W	Charlie Gillett (world)
	H	John Peel (eclectic)
	F	Composer of the Month
0305 R. New Zealand Int.	T	Top 5 (pop/rock)
0310 R. Prague	S	Saturday Music (classical/folk/jazz)
0315 HCIB	T-A	Rendezvous (inspirational)
R. Taipei Int.	W	New Music Lounge
0330 R. New Zealand Int.	T	New Releases
R. Sweden	M	Sounds Nordic (rock-exc. 1st wk.)
WRMI(7385kHz)	S	Drive-In Double Feature (eclectic)
0340 R. Australia	M	Australian Music Show (modern rock)
	T	Music Deli (international)
	W	Blacktracker (Aboriginal)
	H	Oz Country Style
	F	Jazz Notes
0345 HCIB	W	Wonderful Words of Life (hymns)

ENTERTAINMENT/DRAMA/VARIETY

0305 BBC(am)	A	Hitch-Hiker's Guide to the Galaxy
BBC(eas)	A	Wright Around the World (requests)
0330 BBC(am)	M	Westway Omnibus (two episodes)
HCIB	T	Unshackled (radio's oldest drama series)
0332 Voice of Russia	M	Audio Book Club
0340 Voice of Vietnam	M	Sunday Show
0345 BBC(am)	T-A	Off the Shelf (book readings)

SWL, MEDIA, COMMUNICATIONS

0300 WWCR(5070 kHz)	S	Spectrum
0305 R. New Zealand Int.	H	Pacific Divers Report (biweekly)
	RNZI	Talk (meet the staff-biweekly)
0330 WHRI(7315kHz)	M	Dixing with Cumbre
WRMI(7385kHz)	M	Wavescan
0340 R. Habana Cuba	S/W	Divers Unlimited

LISTENER CONTACT/INTERACTIVE

0305 R. Australia	S	Feedback
R. New Zealand Int.	H	Mailbox (biweekly)
0315 R. Prague	A	Mailbox
0320 China R. Int.	A	Listeners' Garden
0330 BBC(am)	W	Write On
R. Sweden	M	In Touch with Stockholm (1st wk.)
R. Taipei Int.	A	Mailbag Time
0340 R. Habana Cuba	H	Mailbag Show
0345 BBC(me)	M	Write On (exc. 2nd or 3rd wk.)
BBC(sas)	A	Write On (exc. 2nd or 3rd wk.)

SPORT

0300 Channel Africa	A	Channel Africa SPORT
R. Australia	S/A	Grandstand (live action)*
R. New Zealand Int.	S/A	Live SPORT (in season)
0310 R. Australia	M-F	SPORT (daily report)
0320 BBC(am)	S/M	Sports Roundup
BBC(me)(af)	D	Sports Roundup
BBC(eas)	S	Sports Roundup
BBC(eas)	F	Sports International (magazine)
0330 China R. Int.	T	Sports World
Deutsche Welle	F	Hard to Beat: The World of SPORT
R. New Zealand Int.	H	The World in SPORT

0335 R. Habana Cuba	T-A	Time Out
0345 R. Sweden	T	Sportscan

(*special on 9660, 12080, 17580, 21725 kHz. only)

0400 UTC/ 12am E/9pm P - Page 44 Freqs

NEWSCASTS (*extended)

0400 BBC(am)(eas)(eu)(me)(af)	D	The World Today*
China R. Int.	D	News
HCIB	T-A	Latin American & World News
R. Australia	D	News
R. Habana Cuba	D	International News
R. New Zealand Int.	D	News
R. Vlaanderen Int.	T-S	News
Voice of Russia	D	News
0430 R. Habana Cuba	T-S	News Bulletin
R. Netherlands	S/M	News
Voice of Russia	D	News in Brief

CURRENT AFFAIRS/FEATURES

0410 China R. Int.	M-F	Current Affairs
HCIB	T-A	Studio 9 (on Latin America)
R. Habana Cuba	T-A	Spotlight on the Americas
0430 BBC(am)(eas)(me)	A	Assignment
BBC(af)	M-F	Network Africa
R. Netherlands	T-A	Newsline

BUSINESS/ECONOMICS

0411 Voice of Russia	H	Newmarket
0413 R. Vlaanderen Int.	F	Economics
0415 China R. Int.	S	Report on Developing Countries
	A	Biz China
0430 BBC(am)(eu)	S	Global Business
China R. Int.	W	China Horizons

SCIENCE/TECHNOLOGY(ind. Health & Environment)

0405 R. Australia	A	Pacific Focus-Environment
0411 Voice of Russia	W/A	Science and Engineering
0413 R. Vlaanderen Int.	W	Green Society (ecology)
0430 R. Australia	A	The Buzz (technology)

ARTS & CULTURE

0405 R. Australia	S	Pacific Focus-Arts
0413 R. Vlaanderen Int.	H/A	Around the Arts
0420 China R. Int.	S	In the Spotlight
0430 R. Australia	S	Arts with Julie Copeland

LOCAL LIVES & VIEWS

0404 R. Vlaanderen Int.	T-A	Belgium Today
0405 R. New Zealand Int.	M-F	In Touch with New Zealand
	A	Best of Kim Hill (interviews)
0408 R. Vlaanderen Int.	M	Tourism in Flanders
0413 R. Vlaanderen Int.	T	Focus on Europe
0418 R. Vlaanderen Int.	H	Around Town
	A	Tourism in Flanders
0420 R. Prague	W	Talking Point
0430 BBC(me)	S	In Praise of God (worship service)
BBC(easf)	A	Talkabout Africa
BBC(wcaf)	A	African Quiz or This Week and Africa
BBC(eu)	A	Network Europe (magazine)
China R. Int.	M	People in the Know
	F	Life in China
0432 Voice of Russia	W	Moscow Yesterday and Today
0435 R. Netherlands	S	Europe Unzipped
0455 R. Netherlands	S	Insight (commentary)

INFORMATIONAL FEATURES

0418 R. Vlaanderen Int.	F	International Report
0420 China R. Int.	H	Voices from Other Lands
0435 R. Habana Cuba	S	The World of Stamps

MUSIC

0400 R. Vlaanderen Int.	S	Music from Flanders
0410 R. Habana Cuba	M	From Habana
0411 Voice of Russia	M	Musical Portraits (history)
0424 R. Vlaanderen Int.	M-A	Soundbox (Flemish rock)
0430 HCIB	A	Musica del Ecuador
R. Australia	A	Jazz Notes
R. Habana Cuba	M	The Jazz Show or Top Tens
0432 Voice of Russia	M	Jazz Show
	T	Yours for the Asking
	H	Folk Box
0446 Voice of Russia	T	Music At Your Request

ENTERTAINMENT/DRAMA/VARIETY

0400 WBCQ(7415 kHz.)	M-A	Amos 'n Andy (classic radio comedy)
0405 R. New Zealand Int.	S	Playhouse (radio theatre)
0410 R. Australia	M-F	Margaret Throsby Interview
0430 BBC(eas)	S	Hitch-Hiker's Guide to the Galaxy
BBC(af)	S	African Performance (plays for radio)

0432 Voice of Russia	F	Audio Book Club
	S/A	Timelines

SWL, MEDIA, COMMUNICATIONS

0400 HCIB	S	DX Party/line
R. Vlaanderen Int.	M	Radio World
WBCQ(7415kHz)	S	Tom and Darryl (electronic media)
WWCR	S	Cyber Line
0420 HCIB	H	Ham Radio Today (within "Studio 9")

LISTENER CONTACT/INTERACTIVE

0400 HCIB	M	Musical Mailbag
0411 Voice of Russia	T/F	Moscow Mailbag
0414 R. Vlaanderen Int.	M	Brussels 1043
0420 China R. Int.	A	Listeners' Garden
0430 HCIB	S	Saludos Amigos
R. Habana Cuba	M	The Mailbag Show
WRMI(7345kHz)	S	Viva Miami
0435 R. Netherlands	M	Sincerely Yours
0445 WWCR(5070 kHz.)	M	Ask WWCR

SPORT

0400 R. Australia	S/A	Grandstand (live action)*
R. New Zealand Int.	S/A	Live sport (in season)
0418 R. Vlaanderen Int.	T	Sports
0430 China R. Int.	T	Sports World
0450 BBC(am)(eas)(eu)(me)	M-F	Sports Roundup

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0500 UTC/ 1am E/10pm P - Page 45 Freqs

NEWSCASTS (*extended)

0500 BBC(eu)(me)(af)(eos)	D	The World Today*
China R. Int.	D	News
Deutsche Welle	D	News
R. Australia	D	News
R. Habana Cuba	D	International News
R. Japan	D	News
Spanish Foreign R.	T-A	Ibero-American News*
R. Habana Cuba	T-A	National News
0510 R. Habana Cuba	T-A	News Bulletin
0530 Voice of Nigeria	S/A	News

CURRENT AFFAIRS/FEATURES

0500 R. New Zealand Int.	M-F	Checkpoint
0505 Deutsche Welle	S	Talking Point (journalists)
	T-A	Newslink
WWCR(5070kHz)	M	A View from Europe
0510 China R. Int.	M-F	Current Affairs
R. Australia	M-F	Pacific Beat
R. Habana Cuba	M	Weekly Review
0515 R. Habana Cuba	T-S	Viewpoint
R. Japan	M-F	44 Minutes
0530 BBC(af)	M-F	Network Africa
BBC(eu)	A	From Our Own Correspondent
Deutsche Welle	T	Insight (international affairs)
0540 R. Habana Cuba	T/F	Caribbean Outlook
	A	Weekly Review
0545 BBC(me)(eu)	A	Letter from America

BUSINESS/ECONOMICS

0500 R. Netherlands	A	A Good Life (development issues)
0505 R. Australia	A	Pacific Focus-Business
0515 China R. Int.	S	Report on Developing Countries
	A	Biz China
Deutsche Welle	S	Markets and Markets
0530 BBC(me)	S	Global Business
	A	World Business Review
China R. Int.	W	China Horizons

SCIENCE/TECHNOLOGY(ind. Health & Environment)

0500 R. Netherlands	T	Research File
0530 Deutsche Welle	W	Man and Environment

ARTS & CULTURE

0500 R. Netherlands	F	Aural Tapestry
0520 China R. Int.	S	In the Spotlight
0530 BBC(af)	S	Artbeat (arts in Africa)

LOCAL LIVES & VIEWS

0500 R. Netherlands	S	Roughly Speaking (Euro youth)
	M	Dutch Horizons
0505 R. New Zealand Int.	A	Focus on Politics
0530 BBC(af)	S	Performance Plus (discussion)
BBC(easf)	A	Africa Quiz or This Week and Africa
BBC(wcaf)	A	Talkabout Africa
China R. Int.	M	People in the Know
	F	Life in China
Deutsche Welle	H	Living in Germany

Shortwave Guide



INFORMATIONAL FEATURES

0500	HCIB	W	The Book & the Spade (archaeology)
	R. Netherlands	H	Documentary
0505	Deutsche Welle	M	Religion and Society
0510	R. New Zealand Int.	S	Touchstone (religion/spirituality)
0515	Deutsche Welle	M	Cool (teen magazine)
0530	BBC(eas)	A	World Learning (educational)
		M	What is Civil Society
		W	Stolen Lives (tragedy's effects)
		H	Chance to Dance (ballet school)
		F	What's the Problem (advice)
	China R. Int.	H	Voices from Other Lands
	Deutsche Welle	A	German by Radio
	R. Australia	A	Lingua Franca (about language)
0547	Spanish Foreign R.	T-A	Spanish Language Course

MUSIC

0500	HCIB	S	Inspirational Classics
	R. Netherlands	W	Music 52-15
	WWCR(5070kHz)	S	World Wide Country MUSIC
0505	WWCR(3210kHz)	A	Rock the Universe (Christian rock)
0510	R. Japan	S	Pop Goes Asia
0525	R. New Zealand Int.	A	In a Mellow Tone
0530	HCIB	A	Walkin' in the Sunshine (country)
	R. Australia	S	Fine Music Australia (classical)

ENTERTAINMENT/DRAMA/VARIETY

0530	BBC(eu)	S	Pick of the World (BBC's best)
	HCIB	M	Unshackled (oldest drama on radio)
		H	Adventures in Odyssey (children's stories)
0545	BBC(eas)	M-F	Off the Shelf (book readings)
	R. Australia	A	Short Story

SWL MEDIA, COMMUNICATIONS

0500	WWCR(3210 kHz.)	M	World of Radio
	WHRI	A	Dixing with Cumbre
0540	R. Habana Cuba	S/W	Dixers Unlimited
0547	Spanish Foreign R.	S	Radio Waves

LISTENER CONTACT/INTERACTIVE

0500	HCIB	S	Saludos Amigos
	WWCR(5070 kHz.)	T	Ask WWCR
0510	R. Japan	A	Hello from Tokyo
0520	China R. Int.	A	Listeners' Garden
0530	BBC(eas)	T	Write On
0535	Spanish Foreign R.	A	Radio Club
0540	R. Habana Cuba	M/H	Mailbag Show
0547	Spanish Foreign R.	M	Radio Club

SPORT

0500	R. Australia	S/A	Grandstand (live action)*
0505	R. Australia	A	Pacific Focus-SPORT
0530	China R. Int.	T	Sports World
	Deutsche Welle	F	Hard to Beat: The World of SPORT
	R. Australia	M-F	SPORT (daily report)
0535	R. Habana Cuba	T-A	Time Out

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

0600 UTC/ 2am E/11pm P - Page 45 Freqs

NEWSCASTS (*extended)

0600	BBC(eu)(wcaf)	D	World Briefing*
	BBC(me)(esaf)	S	World Briefing*
		M-A	News
	BBC(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Habana Cuba	D	International News
	R. Japan	D	News
	R. New Zealand Int.	D	News
0630	R. Habana Cuba	T-S	News Bulletin

CURRENT AFFAIRS/FEATURES

0605	BBC(me)(esaf)	T-A	Outlook
0610	R. Habana Cuba	T-S	Spotlight on the Americas
0615	R. Japan	M-F	Asian Top News (region's radio)
0630	BBC(eu)(me)(af)	S	Agenda (trends)
	BBC(wcaf)	M-F	Network Africa
	R. New Zealand Int.	M-F	Worldwatch
0645	BBC(eu)	M	Letter from America
		TWF	Analysis
		H	From Our Own Correspondent

BUSINESS/ECONOMICS

0630	BBC(eu)	M-F	World Business Report
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SCIENCE/TECHNOLOGY(inc. Health & Environment)

0600	R. Habana Cuba	M	Breakthrough
0634	R. Australia	S	Ockham's Razor

ARTS & CULTURE

0605	BBC(eas)	M	Arts in Action (global)
		T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
	R. New Zealand Int.	S	Whenua (Maori culture)
		M-F	What's Going On

LOCAL LIVES & VIEWS

0605	R. New Zealand Int.	A	Focus on Politics
0610	R. Japan	S	Weekend Square (Japanese life)
0620	R. Australia	M-F	Pacific Focus
0630	BBC(eu)(eas)	A	People and Politics
	BBC(wcaf)	A	African Quiz or This Week and Africa

INFORMATIONAL FEATURES

0605	BBC(eas)	M	Omnibus (documentary)
	R. Australia	S	The Europeans
	WWCR(5070kHz.)	S	This Week in Americana (antiques)
0625	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
0635	R. Habana Cuba	S	The World of Stamps
0645	BBC(me)(esaf)	A	Patterns of Faith

MUSIC

0600	HCIB	T	Chords of Love (sacred)
		A	Wonderful Words of Life (hymns)
	WWCR(3210kHz)	T-F	World Wide Country Radio
0605	BBC(eas)	F	The Music Biz (industry)
	WHRI(7315kHz)	A	Turn Your Radio On
	WWCR(3210kHz)	S	Big Backyard (Australian country)
0610	R. Habana Cuba	M	From Havana (Cuban musicians)
	R. Japan	A	Pop Goes Asia
0625	R. Japan	M	Unforgettable Masterpieces
		W	Japan Music Log
		F	Music Beat (pop)
0630	BBC(eas)	M	Jazzmatazz
		T	Charlie Gillett (world)
		W	UK Top 20 (pop/rock)
		H	Revolver (artist selections)
		F	John Peel (eclectic)
	HCIB	T-A	Night sounds (inspirational)
	R. Australia	A	Oz Sounds
	R. Habana Cuba	M	The Jazz Show or Top Tens
0640	R. Australia	M	Australian Music Show (modern rock)
		T	Music Deli (international)
		W	Blacktracker (Aboriginal)
		H	Country Style
		F	Jazz Notes

ENTERTAINMENT/DRAMA/VARIETY

0605	R. New Zealand Int.	A	Saturday Night
0630	BBC(eas)	S	Westway Omnibus (two episodes)
0645	BBC(me)(esaf)	M-F	Off the Shelf (readings)
	R. New Zealand Int.	M-F	Storytime

SWL MEDIA, COMMUNICATIONS

0600	WWCR(3210kHz)	M	Spectrum
0630	WHRI (5745kHz)	S	Dixing with Cumbre
	WWCR(5070kHz)	S	World of Radio

LISTENER CONTACT/INTERACTIVE

0600	HCIB	S	Saludos Amigos
0605	BBC(me)(esaf)	M	Talking Point (global phone-in)
	R. Australia	S	Feedback
0645	BBC(esaf)	A	Write On (exc. 2nd or 3rd wk.)

SPORT

0600	R. Australia	S/A	Grandstand (live action)*
0610	R. Australia	M-F	SPORT (daily report)
0620	BBC(eu)(wcaf)	D	Sports Roundup
	BBC(me)(af)	S	Sports Roundup
	BBC(eas)	S/A	Sports Roundup

(*special on 9660, 12080, 17580, 17750, 21725 kHz. only.)

1000 UTC/6am E/3am P - Page 47 Freqs

NEWSCASTS (*extended)

1000	BBC(am)(eu)(me)	D	World Briefing*
	BBC(eas)	S	News Summary
		M-F	World Briefing*
		A	News Summary
	R. Australia	D	News
	R. New Zealand Int.	D	News
	VOA News Now	D	World News
1010	VOA News Now	D	Regional News
1014	VOA News Now	D	USA News
1030	R. Netherlands	S/A	News
	VOA News Now	D	World News

CURRENT AFFAIRS/FEATURES

1005	R. Australia	M-F	Asia Pacific
	R. New Zealand Int.	M-F	Late Edition
1030	BBC(am)	S	Agenda (trends)
	R. Netherlands	M-F	Newsline
1035	R. Netherlands	S	Wide Angle

BUSINESS/ECONOMICS

1030	BBC(am)(eas)(me)(eu)	M-F	World Business Report
1049	VOA News Now	M-F	Business and Economic Report

SCIENCE/TECHNOLOGY(inc. Health & Environment)

1005	R. Australia	S	The Buzz (technology)
1030	BBC(eu)	A	Science in Action
	R. Australia	M	Health Report
		A	In Conversation
1045	VOA News Now	M-F	Science, Medicine, Environment

LOCAL LIVES & VIEWS

1005	R. Australia	A	Pacific Review
1030	BBC(eu)	S	Network Europe
	R. Australia	S	Rural Reporter (the outback)
1035	R. Netherlands	A	Europe Unzipped
	R. New Zealand Int.	S	Sunday Supplement
1055	R. Netherlands	S	Insight

INFORMATIONAL FEATURES

1030	BBC(am)(eu)	A	Reporting Religion
	BBC(me)	S/A	World Learning (educational)
	R. Australia	T	Law Report
		W	Religion Report
		A	In Conversation
1033	VOA News Now	S	On the Line (US foreign policy)

MUSIC

1000	WWCR(5070kHz)	A	The Old Record Shop
1005	BBC(eas)	S	Concert Hall (classical)
		A	Composer of the Month
	R. New Zealand Int.	A	Deep Purple (relaxing)
1030	BBC(eas)	A	Music Review (magazine)

LISTENER CONTACT/INTERACTIVE

1015	WWCR(15685 kHz.)	S	Ask WWCR
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SWL MEDIA, COMMUNICATIONS

1011	R. New Zealand Int.	S	Mediawatch
1030	R. Australia	H	Media Report

SPORT

1020	BBC(am)(eu)(me)	S/A	Sports Roundup
1030	R. Australia	F	Sports Factor
1045	BBC(am)(eas)(me)(eu)	M-F	Sports Roundup

1100 UTC/ 7am E/4am P - Page 48 Freqs

NEWSCASTS (*extended)

1100	BBC(am)(eu)	D	World Briefing*
	BBC(me)	S	World Briefing*
		M-A	News
	BBC(eas)	S/A	World Briefing*
		M-F	News
	R. Australia	D	News
	R. Japan	D	News
	R. New Zealand Int.	D	News
1120	BBC(am)(eu)	D	British News
	BBC(me)	S	British News
	BBC(eas)	S/A	British News
1130	R. Korea Int.	D	News

CURRENT AFFAIRS/FEATURES

1105	BBC(am)	M-F	Caribbean Morning Report*
	R. Australia	S	Correspondents Report
		M-A	Asia Pacific
1115	R. Japan	M-F	Asian Top News (region's radio)
1130	BBC(am)(me)	S	Assignment (in-depth)
	BBC(am)(eu)	TWFA	Analysis (one issue)
	BBC(eu)	M	Letter from America
		H	From Our Own Correspondent
	BBC(eas)	A	Analysis (one issue)
	R. Sweden	M-F	60 Degrees North
1145	R. Korea Int.	M-F	Seoul Calling

(*special to Caribbean on 6195, 15190 kHz. only.)

BUSINESS/ECONOMICS

1100	R. Netherlands	T	A Good Life (development issues)
1128	HCIB	M-F	Money Minute
1130	R. Australia	S	The Business Report
	R. Netherlands	F	A Good Life
1145	R. Sweden	W	Money Matters

Shortwave Guide



SCIENCE/TECHNOLOGY (incl. Health & Environment)

1100	R. Netherlands	H	Research File
1105	BBC(eas)	M	Health Matters
		T	Go Digital (technology)
		W	Discovery (research)
		H	One Planet (ecology)
		F	Science in Action (magazine)
1115	WWCR(15685kHz)	A	Eco Watch
1130	R. Netherlands	M	Research File
1145	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

ARTS & CULTURE

1100	R. Netherlands	S	Aural Tapestry
1105	BBC(me)	M	Arts in Action (global)
		T	Meridian-Masterpiece (ideas)
		W	Meridian-Screen (cinema)
		H	Meridian-Writing (books)
1130	BBC(eu)	S	Arts in Action
	R. Netherlands	H	Aural Tapestry
	R. Sweden	S	Spectrum (3rd wk.)

LOCAL LIVES & VIEWS

1100	R. Netherlands	M	Euroquest
		W	Dutch Horizons
		A	Roughly Speaking (Euro youth)
1105	R. New Zealand Int.	S/A	NZ Forces Radio
		M-H	Kim Hill (interviews)
1115	BBC(am)	M-F	Caribbean Magazine*
1130	BBC(am)(eu)	M	Letter from America
	R. Netherlands	S	Dutch Horizons
	R. Sweden	A	Weekend (Europe magazine-1st wk.)
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)
1130	R. Australia	M-F	Bush Telegraph (rural)
1145	R. Sweden	H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

(*special to Caribbean on 6195, 15190 kHz. only)

INFORMATIONAL FEATURES

1100	R. Netherlands	F	Documentary
1105	WWCR(5070kHz)	A	This Week in Americana (antiques)
1125	R. Japan	T	Let's Learn Japanese
		H	Brush Up Your Japanese
1130	BBC(eas)	M	Everywoman (magazine)
		T	Omnibus (documentaries)
		H	People and Places
		F	At the Edge of Asia (about S. Korea/Japan)
	R. Netherlands	W	Documentary

MUSIC

1100	HCIB	S	Morning Song (hymns)
	WWCR(5070kHz)	S	Ken's Country Classics
1105	BBC(me)	F	The Music Biz (industry)
1110	R. Japan	A	Pop Goes Asia
1125	R. Japan	M	Unforgettable Masterpieces
		W	Japan Music Log
		F	Music Beat (pop)
1130	BBC(me)	M	Jazzmatazz
		T	Charlie Gillett (world)
		W	UK Top 20
		H	Revolver (artist selections)
		F	John Peel (eclectic)
	R. Australia	A	Find Music Australia (classical)
	R. Netherlands	T/A	Music 52-15 (international)
	R. New Zealand Int.	F	RNZ Top 5
	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
1140	R. Korea Int.	S	Korean Pop Interactive (requests)

ENTERTAINMENT/DRAMA/VARIETY

1105	BBC(me)	A	Wright Around the World (pop requests)
1130	BBC(eas)	S	Play of the Week (radio theatre)
	HCIB	M-F	Morning in the Mountains

SWL, MEDIA, COMMUNICATIONS

1100	WWCR(15685kHz)	T	World of Radio
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LISTENER CONTACT/INTERACTIVE

1110	R. Japan	S	Hello From Tokyo
1130	R. Sweden	S	In Touch with Stockholm (1st wk.)

SPORT

1105	R. New Zealand Int.	F	Sports Story
1110	BBC(am)	M-F	Caribbean sport*
1130	BBC(eas)	W	Sports International
1145	BBC(am)(eu)	M-H/A	Sports Roundup
	BBC(eas)	A	Sports Roundup
	BBC(am)(eu)	F	Football Extra
	BBC(af)	M-H	Sports Roundup
	R. Sweden	M	Sportscan

(*special to Caribbean on 6195, 15190 kHz. only)

1200 UTC/ 8am E/5am P - Page 48 Freqs

NEWSCASTS (*extended)

1200	BBC(am)(me)(eu)	D	Newshour*
	BBC(eas)	M-A	News
	HCIB	M-F	Latin American & World News
	R. Australia	D	News
	R. Canada Int.	M-F	News
	R. Netherlands	S/A	News
	R. New Zealand Int.	M-F	News
1230	HCIB	M-F	Latin American & World News

Current Events Magazines/Features

1200	R. Netherlands	M-F	Newsline
	WWCR(12160kHz)	S	Dialogue
1205	BBC(eas)	M-F	Outlook (magazine)
	R. Australia	M-H	Late Night Live (discussion)
	R. New Zealand Int.	M-F	Late Edition
1210	BBC(am)	M-F	Caribbean Morning Report 2*
	R. Canada Int.	M-F	This Morning
1230	BBC(eas)	S	Agenda (trends)
		A	Assignment (in-depth)
	R. Sweden	M-F	60 Degrees North

(*special to Caribbean on 6195, 15190 kHz. only)

BUSINESS/ECONOMICS

1205	BBC(am)	M-F	Caribbean Business*
1245	R. Sweden	W	Money Matters

(*special to Caribbean on 6195, 15190 kHz. only)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1245	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (3rd wk.)

ARTS & CULTURE

1230	R. Sweden	A	Spectrum (3rd wk.)
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LOCAL LIVES & VIEWS

1200	R. Korea Int.	T	Korean Kaleidoscope
		A	Figure of the Week
1205	R. Netherlands	A	Europe Unzipped
	R. New Zealand Int.	S/A	NZ Forces Radio
1230	R. Sweden	A	Weekend (Europe magazine-1st wk.)
			Sweden Today (2nd)
			Studio 49 (discussion-3rd)
	YLE R. Finland	M-H	Finland This Morning
		F	Capital Cafe (conversations)
		A	Finland This Week
1245	R. Sweden	H	Nordic Report (1st)
			The S-Files (things Swedish-4th)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1205	R. Australia	A	The Spirit of Things (spiritual matters)
1220	HCIB	M-F	Mission Network News
1230	HCIB	A	Adventures in Odyssey (stories)
1245	BBC(eas)	T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)
	YLE R. Finland	A	Starting Finnish (language lesson)

MUSIC

1200	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)
1205	R. Australia	S	Nocturne (mostly classical)
		F	Sound Quality (innovative)

ENTERTAINMENT/DRAMA/VARIETY

1200	BBC(eas)	S	Play of the Week (from 1130)
	HCIB	M-F	Morning in the Mountains (from 1130)
1205	BBC(eas)	A	Hitch-Hiker's Guide to the Galaxy
1245	BBC(eas)	W/F	Westway (drama serial)

SWL, MEDIA, COMMUNICATIONS

1200	R. Korea Int.	M	Multiwave Feedback
	WHRI (6040kHz)	A	Dxing with Cumbre
1230	WHRI(15105kHz)	A	Dxing with Cumbre

LISTENER CONTACT/INTERACTIVE

1200	R. Korea Int.	A	From Us to You
1205	R. Netherlands	S	Sincerely Yours
1230	R. Sweden	S	In Touch with Stockholm (1st wk.)
1245	BBC(am)	M	Write On

SPORT

1200	R. Korea Int.	W	SPORT
1205	HCIB	M-F	Sports News
	R. New Zealand Int.	S	Sportsworld (magazine)
1245	R. Sweden	M	Sportscan

1300 UTC/ 9am E/6am P - Page 49 Freqs

NEWSCASTS (*extended)

1300	BBC(am)(me)(eu)	D	News
	BBC(eas)(easf)	D	Newshour*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	R. New Zealand Int.	D	News

CURRENT AFFAIRS/FEATURES

1305	BBC(am)(eu)	M-F	Outlook
	R. Canada Int.	M-F	This Morning (from 1210)
1310	China R. Int.	M-F	Current Affairs
	R. Canada Int.	S	The Sunday Edition (arts/politics/ideas)
1330	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS

1315	China R. Int.	S	Report on Developing Countries
		A	Biz China
	R. Australia	M-F	Dust and Dollars
1320	China R. Int.	W	China Horizon
1330	BBC(eu)	S	Global Business
1345	R. Sweden	W	Money Matters
1350	BBC(eas)	M-F	World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1305	BBC(me)	M	Science in Action (magazine)
		T	Health Matters
		W	Go Digital (technology)
		H	Discovery (research)
		F	One Planet (ecology)
	R. Australia	A	The Science Show
1345	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

Arts/Culture

1320	China R. Int.	S	In the Spotlight
1330	R. Sweden	A	Spectrum (3rd Sat.)

LOCAL LIVES & VIEWS

1310	R. Canada Int.	A	The House (Canadian politics)
1330	China R. Int.	M	People in the Know
		F	Life in China
1330	BBC(am)	S	In Praise of God (worship service)
	BBC(me)	A	People & Politics (Parliament)
	R. Sweden	A	Weekend (Europe magazine-1st wk.)
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)
1345	R. Sweden	H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1320	China R. Int.	H	Voices from Other Lands
1330	BBC(me)	S	Reporting Religion
		M	At the Edge of Asia (about S. Korea/Japan)
		T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	People and Places
	HCIB	M-F	Family Life Today
1345	BBC(eu)	T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)

MUSIC

1305	BBC(am)	S	Composer of the Month
	BBC(me)	A	Composer of the Month
	R. Australia	S	Nocturne (from 1205)
1320	R. Australia	M-F	The Planet (international)
1330	BBC(am)	A	The Music Feature
		S	Sounds Nordic (rock/pop-exc. 1st wk.)
	WWCR(15685kHz)	A	The Old Record Shop

ENTERTAINMENT/DRAMA/VARIETY

1300	Channel Africa	S/A	Channel Africa Extra (weekend variety)
	HCIB	S	Weekend Magazine
1305	BBC(eu)	S	Hitch-Hiker's Guide to the Galaxy
		A	Wright Around the World (requests)
1330	BBC(me)	S	Pick of the World (BBC's best)
1345	BBC(am)	M-F	Off the Shelf (book readings)
	BBC(eu)	W/F	Westway (drama serial)

LISTENER CONTACT/INTERACTIVE

1315	WWCR(15685kHz)	A	Ask WWCR
1320	China R. Int.	A	Listeners' Garden
1330	R. Sweden	S	In Touch with Stockholm (1st wk.)
1345	BBC(eu)	M	Write On

SPORT

1305	BBC(am)	A	World Football (magazine)
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Shortwave Guide



1310	R. Australia	M-F	SPORT (daily report)
1330	BBC(me)	H	Sports International (magazine)
	China R. Int.	T	Sports World
1345	R. Sweden	M	Sportscan

1400 UTC/ 10am E/7am P - Page 49 Freqs

NEWSCASTS (*extended)

1400	BBC(am)(eu)	D	News
	BBC(me)(esaf)(eas)	S/A	News
	BBC(me)(esaf)	M-F	World Briefing*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	R. Japan	D	News
1430	BBC(me)(esaf)(eas)	M-F	British News
	R. Netherlands	S/A	News

CURRENT AFFAIRS/FEATURES

1400	BBC(eas)	M-F	East Asia Today
1405	R. Canada Int.	S	The Sunday Edition (from 1310)
		M-F	This Morning (from 1210)
1410	China R. Int.	M-F	Current Affairs
1415	R. Japan	M-F	44 Minutes
1430	R. Netherlands	M-F	Newsline

BUSINESS/ECONOMICS

1415	China R. Int.	S	Report on Developing Countries
		A	Biz China
1420	BBC(me)(esaf)	M-F	World Business Report
	China R. Int.	W	China Horizons

SCIENCE/TECHNOLOGY(incd. Health & Environment)

1405	BBC(eu)	M	Science in Action (magazine)
		T	Health Matters
		W	Go Digital (technology)
		H	Discovery (research)
		F	One Planet (ecology)

ARTS & CULTURE

1405	BBC(am)	M	Meridian-Masterpiece (ideas)
		T	Meridian-Screen (cinema)
		W	Meridian-Writing (books)
		F	Arts in Action (global)
	R. Australia	S	Books and Writing
1420	China R. Int.	S	In the Spotlight

LOCAL LIVES & VIEWS

1410	R. Japan	S	Weekend Square
1430	China R. Int.	M	People in the Know
		F	Life in China
	R. Canada Int.	F	C'est La Vie (life in Quebec)
1436	R. Netherlands	A	Europe Unzipped
1445	R. Canada Int.	M-H	Out Front (personally produced radio)
1455	R. Netherlands	A	Insight

INFORMATIONAL FEATURES

1405	R. Australia	A	New Dimensions ("progressive" ideas)
1420	China R. Int.	H	Voices from Other Lands
1430	BBC(eu)	M	At the Edge of Asia (about S. Korea/Japan)
		T	Everywoman (magazine)
		W	Omnibus (documentaries)
		F	People and Places

MUSIC

1405	BBC(am)	H	The Music Biz (industry)
	R. Australia	M-F	The Planet (from 1315)
	R. Japan	S	Pop Goes Asia
1430	BBC(am)	M	Charlie Gillett (world)
		T	UK Top 20 (pop/rock)
		W	Revolver (artist selection)
		H	John Peel (eclectic)
		F	Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1400	Channel Africa	S/A	Channel Africa Extra (from 1300)
1405	R. Canada Int.	A	Vinyl Cafe (humor)

LISTENER CONTACT/INTERACTIVE

1405	BBC	S	Talking Point (current events call-in)[live]
1420	China R. Int.	A	Listeners' Garden
1438	R. Netherlands	S	Sincerely Yours

SPORT

1405	BBC	A	Sportsworld (live action)
1430	BBC(eu)	H	Sports International
	China R. Int.	T	Sports World
1445	BBC(me)(esaf)(eas)	M-H	Sports Roundup
		F	Football Extra

1500 UTC/ 11am E/8am P - Page 50 Freqs

NEWSCASTS (*extended)

1500	BBC(am)(me)(af)(eas)	D	News
	BBC(eu)	S/A	News
		M-F	World Briefing*
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	S/A	News
1530	BBC(eu)	M-F	British News

CURRENT EVENTS/FEATURES

1505	BBC(me)	M-F	Outlook (topical magazine)
	BBC(af)	M-F	Focus on Africa
	R. Australia	M-F	Asia Pacific
	R. Canada Int.	S	The Sunday Edition (from 1310)
1510	China R. Int.	M-F	Current Affairs
1530	R. Austria Int.	D	Report from Austria
1545	BBC(eu)	MTHF	Analysis
		W	From Our Own Correspondent

BUSINESS/FINANCE

1500	R. Netherlands	F	A Good Life
1515	China R. Int.	S	Report on Developing Countries
		A	Biz China
1530	China R. Int.	W	China Horizons
	R. Netherlands	T	A Good Life (development issues)

SCIENCE/TECHNOLOGY(incd. Health & Environment)

1500	R. Netherlands	M	Research File
1505	BBC(am)	M	One Planet (ecology)
		T	Science in Action (magazine)
		W	Health Matters
		H	Go Digital (technology)
		F	Discovery (research)
	R. Canada Int.	A	Quirks and Quarks
1530	R. Australia	M	The Health Report
	R. Netherlands	H	Research File

ARTS & CULTURE

1500	R. Netherlands	H	Aural Tapestry
1505	BBC(eas)	M	Meridian-Masterpiece (ideas)
		T	Meridian-Screen (cinema)
		W	Meridian-Writing (books)
		H	Meridian-Writing (books)
		F	Arts in Action (global)
1520	China R. Int.	S	In the Spotlight
1530	R. Netherlands	S	Aural Tapestry

LOCAL LIVES & VIEWS

1500	R. Netherlands	S	Dutch Horizons
1530	China R. Int.	M	People in the Know
		F	Life in China
	R. Netherlands	M	Euroquest
		W	Dutch Horizons
		A	Roughly Speaking (Euro youth)
1540	R. Austria Int.	A	Radio E (on Europe)

INFORMATIONAL FEATURES

1500	R. Netherlands	W	Documentary
1505	R. Australia	S	Encounter (spiritual beliefs)
1520	China R. Int.	H	Voices from Other Lands
1530	BBC(am)	M	People and Places
		T	At the Edge of Asia (about S. Korea/Japan)
		W	Everywoman (magazine)
		H	Omnibus (documentaries)
		T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)
	R. Australia	T	The Law Report
		W	The Religion Report
	R. Netherlands	F	Documentary
1545	BBC(me)	T	Stolen Lives (tragedy's effects)
		H	What's the Problem? (advice)

MUSIC

1500	R. Netherlands	T/A	Music 52-15 (international)
1505	BBC(am)(eu)(me)	S	Concert Hall
	BBC(eas)(esaf)	S	Composer of the Month
	BBC(eas)	H	The Music Biz (industry)
	R. Australia	A	Nocturne (mostly classical)
1530	BBC(eas)	M	Charlie Gillett (world)
		T	UK Top 20
		W	Revolver (artist selection)
		H	John Peel (eclectic)
		F	Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1505	BBC(wcaf)	S	Play of the Week (radio theatre)
1530	BBC(esaf)	S	Pick of the World (BBC's best)
	BBC(af)	W/F	Westway (drama serial)
1545	BBC(me)	W/F	Westway (drama serial)
	BBC(af)	M-F	Off the Shelf (readings)

SWL, MEDIA, COMMUNICATIONS

1530	R. Australia	H	The Media Report
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LISTENER CONTACT/INTERACTIVE

1520	China R. Int.	A	Listeners' Garden
1530	BBC(af)	M	Write On
1545	BBC(me)	M	Write On
	R. Austria Int.	A	Listeners' Letters

SPORT

1505	BBC(am)	F	Sports International (magazine)
	BBC	A	Sportsworld (from 1405)
1530	China R. Int.	T	Sports World
	R. Australia	F	The Sports Factor

1600 UTC/ 12pm E/9am P - Page 50 Freqs

NEWSCASTS (*extended)

1600	BBC(am)(eu)	S/A	News
	BBC(me)(af)(sas)	D	News
	R. Australia	D	News
	R. Netherlands	S/A	News

CURRENT EVENTS/FEATURES

1600	BBC(am)(eu)	M-F	Europe Today
	R. Netherlands	M-F	Newsline
1608	R. Netherlands	S	Wide Angle

BUSINESS/FINANCE

1630	BBC(am)(eu)	M-F	World Business Report
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SCIENCE/TECHNOLOGY(incd. Health & Environment)

1605	BBC(sas)	M	Health Matters
		T	Go Digital (technology)
		W	Discovery (research)
		H	One Planet (ecology)
		F	Science in Action (magazine)

ARTS & CULTURE

1605	BBC(me)(af)	M	Meridian-Masterpiece (ideas)
		T	Meridian-Screen (cinema)
		W	Meridian-Writing (books)
		F	Arts in Action (global)
1630	BBC(af)	H	Artbeat

LOCAL LIVES & VIEWS

1605	R. Australia	S	The National Interest
		T	The Comfort Zone (homes/gardens/food)
		W	Verbatim (oral histories)
		H	Hindsight (history)
		F	Away! (Aboriginal culture)
1606	R. Netherlands	A	Europe Unzipped
1630	BBC(af)	W	Talkabout Africa
		H	Performance Plus (discussion)
	R. Australia	W	Earshot (Australian voices)

INFORMATIONAL FEATURES

1605	BBC(af)	F	Omnibus (documentary)
1630	BBC(sas)	M	Everywoman (magazine)
		T	Omnibus (documentaries)
		H	People and Places
		F	At the Edge of Asia (about S. Korea/Japan)

MUSIC

1600	WWCR(15685kHz)	M-F	World Wide Country Radio
1605	BBC(me)(af)	H	The Music Biz (industry)
	R. Australia	A	Nocturne (from 1505)
1630	BBC(me)	M	Charlie Gillett (world)
		T	UK Top 20 (pop/rock)
		W	Revolver (artist selections)
		H	John Peel (eclectic)
		F	Jazzmatazz

ENTERTAINMENT/DRAMA/VARIETY

1605	R. Australia	M	Margaret Throsby Interview
1630	BBC(me)	W/F	Westway (drama serial)
	BBC(af)	T	African Performance (plays)

SPORT

1605	BBC	S	Sunday Sportsworld
		A	Sportsworld (from 1405)
1630	BBC(sas)	W	Sports International (magazine)
	BBC(af)	M/F	Fast Track
1645	BBC(am)(eu)	M-F	Sports Roundup

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

NEWSCASTS

2100	BBC(am)(wcaf)(eu)	D	News
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Shortwave Guide



R. Australia D News
2120 BBC(am)(eu) M-A British News

CURRENT EVENTS/FEATURES

2110 R. Australia S-H AM (morning news magazine)
2130 BBC(eu) A Assignment (in-depth)
2145 BBC(am) MTHF Analysis
W From Our Own Correspondent

BUSINESS/FINANCE

2105 BBC(am) S Global Business
A World Business Review
BBC(am)(eu) M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2105 BBC(wcaft) M Health Matters
T Go Digital (technology)
W Discovery (research)
H One Planet (ecology)
F Science in Action (magazine)
2130 R. Australia M Health Report
T Innovations

LOCAL LIVES & VIEWS

2105 R. Australia A Australia All Over
2115 BBC(am) M-F Caribbean Report*
2130 BBC(am) T/F Calling the Falklands ^
BBC(wcaft) A People and Politics
R. Australia H Rural Reporter
2145 BBC(am) A Letter from America
(*special service on 5975, 11675, 15390 kHz. only.)
(^ special service on 11720 kHz.)

INFORMATIONAL FEATURES

2130 BBC(wcaft) M Everywoman (magazine)
T Omnibus (documentaries)
H People and Places
F At the Edge of Asia (about S. Korea/Japan)
R. Australia S Time to Talk (Pacific island nations)
2145 BBC(am) W Religion Report
A Patterns of Faith

MUSIC

2100 WBCQ(7415kHz) S Radio Free Euphoria
A HanZower
2105 BBC(eu) A Composer of the Month
2130 BBC(wcaft) A Composer of the Month
R. Australia F Oz Sounds
WBCQ(7415kHz) F Pab Sungien Project (obscure oldies)

ENTERTAINMENT/DRAMA/VARIETY

2100 WBCQ(7415kHz) M Jean Shepherd (humor)
F Juliet's Wild Kingdom
2105 BBC(wcaft) S Wright Around the World (requests)
BBC(eu) S Pick of the World (BBC's best)
2130 BBC(eu) S Hitch-Hiker's Guide to the Galaxy
BBC(wcaft) W Pick of the World (BBC's best)
2145 BBC(eu) M-F Off the Shelf (readings)

SWL, MEDIA, COMMUNICATIONS

2100 WHRI(5745kHz) S DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

2105 R. Australia F Feedback
2145 BBC(am) S Write On

SPORT

2130 BBC(wcaft) W Sports International
BBC(am) D Sports Roundup
BBC(eu) M-F Sports Roundup

BBC(am)(wcaft)(eu) A From Our Own Correspondent
R. Australia A AM Saturday
R. Canada Int. M-F As It Happens (interviews)
2243 R. Vlaanderen Int. M Focus on Europe
2248 R. Vlaanderen Int. H International Report

BUSINESS/FINANCE

2230 R. Australia A The Business Report
2240 R. Prague H Economic Report
2243 R. Vlaanderen Int. H Economics

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2243 R. Vlaanderen Int. T Green Society (ecology)

ARTS & CULTURE

2335 R. Prague A Readings from Czech Literature
2340 R. Prague S The Arts
2243 R. Vlaanderen Int. W/F Around the Arts

LOCAL LIVES & VIEWS

2230 BBC(am)(eu) F People and Politics
2234 R. Vlaanderen Int. M-F Belgium Today
2235 R. Prague S Letter from Prague
M-F Current Affairs
2238 R. Vlaanderen Int. S Tourism in Flanders
2245 R. Prague M Spotlight (Czech current events) or One on One (interview)
W Czechs in History or Central Europe Today
2248 R. Vlaanderen Int. W Around Town
F Tourism in Flanders
2250 R. Prague T Talking Point
F From the Weeklies

INFORMATIONAL FEATURES

2245 BBC(wcaft) T Stolen Lives (tragedy's effects)
H What's the Problem? (advice)

MUSIC

2200 WBCQ(7415kHz) F Pab Sungien (from 2130)
A Radio Timtron Worldwide
2230 R. Vlaanderen Int. A Music from Flanders
2240 R. Australia S Australian Music Show (rock)
M Music Deli (international)
T Blacktrucker (Aboriginal contemporary)
W Australian Country Style
H Jazz Notes
2240 R. Prague A Saturday Music (classical/folk/jazz)
2254 R. Vlaanderen Int. S-F Soundbox

ENTERTAINMENT/DRAMA/VARIETY

2205 BBC(wcaft) S Hitch-Hiker's Guide to the Galaxy
A Pick of the World (BBC's best)
2230 R. Canada Int. A Madly Off in All Directions (comedy)
WBCQ(7415kHz) F Wonton Display of Control & Disruption (satire)
2245 BBC(wcaft) W/F Westway (drama serial)

SWL, MEDIA, COMMUNICATIONS

2230 R. Vlaanderen Int. S Radio World
WHRI(9495kHz) A DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

2244 R. Vlaanderen Int. S Brussels 1043
2245 BBC(wcaft) M Write On
R. Prague F Mailbox

SPORT

2230 R. Canada Int. S Inside Track (anthologies)
2248 R. Vlaanderen Int. M Sports

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

NEWSCASTS (*extended)

2300 BBC(am) S The World Today*
M-F News
A News Summary
BBC(eas) D The World Today
China R. Int. D News
R. Australia D News
R. Canada Int. D News
2330 R. Netherlands S/A News

CURRENT EVENTS/FEATURES

2305 BBC(am) M-F Outlook
R. Canada Int. M-F As It Happens (from 2230)
2310 China R. Int. S-H Current Affairs
R. Australia S-H Asia Pacific
2330 R. Canada Int. W Dispatches (international)
R. Netherlands M-F Newslime
2355 R. Netherlands F Insight (commentary)

BUSINESS/ECONOMICS

2315 China R. Int. F Biz China
A Report on Developing Countries
2330 China R. Int. T China Horizons

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2305 R. Australia A All in the Mind (the human brain)
R. Canada Int. A Quirks and Quarks
2330 R. Australia S Earthbeat (ecology)
M The Buzz (technology)
A Innovations
BBC(eas) F Global Business

ARTS & CULTURE

2320 China R. Int. A In the Spotlight
2330 R. Australia T Arts with Julie Capeland

LOCAL LIVES & VIEWS

2330 China R. Int. S People in the Know
H Life in China
R. Australia W Rural Reporter (outback)
2335 R. Netherlands A Europe Unzipped

INFORMATIONAL FEATURES

2305 R. Australia F Lingua Franca (about language)
2330 China R. Int. W Voices from Other Lands
2345 BBC(am) T Stolen Lives (tragedy's effects)
H What's the Problem? (advice)

MUSIC

2300 WBCQ(7415kHz) H Goddess Irena I Music Show
F The Lost Discs Radio Show
2305 R. Canada Int. S Global Village (world/folk)
2330 WBCQ(7415kHz) A Fred Flintstone's Music Show

ENTERTAINMENT/DRAMA/VARIETY

2300 WBCQ(7415kHz) S Le Show with Harry Shearer
2301 BBC(am) A Play of the Week (radio theatre)
2305 WWCR(5070kHz) W/F Golden Age of Radio Theatre
2320 R. Australia F Short Story
2330 BBC(am) S Pick of the World (BBC's best)
BBC(eas) A Pick of the World (BBC's best)
2345 BBC(am) W/F Westway (drama serial)

SWL, MEDIA, COMMUNICATIONS

2300 WBCQ97415kHz) A The Real Amateur Radio Show
2330 R. Australia H The Media Report
WBCQ(7415kHz) W World of Radio

LISTENER CONTACT/INTERACTIVE

2320 China R. Int. F Listeners' Garden
2335 R. Netherlands S Sincerely Yours
2345 BBC(am) M Write On

SPORT

2330 China R. Int. M Sports World
R. Australia F The Sports Factor

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Harold Frodge, Midland, MI; Michael Murray, UK; Daniel Sampson, Arcadia, WI; Adrian Sainsbury, Radio New Zealand Intl; Harold Sellers, Larry Van Horn, Brasstown, NC; Cumbre DX; DX Listening Digest; Listening In; Hard Core DX; NASWA; World of Radio; Worldwide DX Club.

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

NEWSCASTS (*extended)

2200 BBC(am)(eu) D The World Today*
BBC(wcaft) D News
R. Australia D News
2230 R. Canada Int. M-F World at Six*
R. Prague D News
R. Vlaanderen Int. M-F News

CURRENT EVENTS/FEATURES

2200 R. Canada Int. S/A The World This Weekend
2205 BBC(wcaft) M-F Outlook (topical magazine)
R. Australia A Correspondents Report
2210 R. Australia S-H AM (morning news magazine)
F Asia Pacific
A Correspondents' Report
2230 BBC(am) S Agenda (trends)
BBC(wcaft) S Assignment (in-depth)

Are You Equipped?

There has been a welcome surge in correspondence, often concerning start-up equipment, so a brief review might be of help to those now starting out.

If you have a general purpose utility scanner and an external antenna, you already have the basic hardware to receive satellite telemetry. Many people pursue the hobby of satellite monitoring with this combination of equipment, and as long as the receiver can tune to a wide range of frequencies, you should be able to monitor amateur radio satellites, weather and some communications satellites. Software is available to accurately calculate the times when various satellites will pass over your location, and if you have Internet access you can update the Kepler elements that are required for accurate predictions.

If you wish to produce images from the signals that you hear, you have to go one stage further. Unlike terrestrial utility signals – for which general purpose scanners are mostly designed – weather satellites transmit an unusual signal format. Both geostationary and polar-orbiting weather satellites transmit a signal that combines both a.m. (amplitude modulation) and f.m. (frequency modulation) in one signal. Images contain large amounts of data, so they can only be transmitted within a signal having an unusually wide bandwidth – about 40 kHz – and this is the main reason that a general purpose scanner can not normally be used to produce good quality images.

A second reason is that the antennas often used for terrestrial signal reception are not optimized for WXSATs. NOAA WXSATs transmit a circularly polarized signal, so most monitors use a crossed-dipole or comparable antenna – suitably phased for the satellites. Meteor WXSATs transmit a linearly polarized signal, so this preference does not apply.

Using a purpose-designed WXSAT receiver fed by a suitable antenna, combines the best of both worlds and should provide the optimum APT (Automatic Picture Transmission) signal.

The other popular WXSAT format is Wefax, transmitted by many geostationary satellites.

❖ Satellite Status Report

This month I am extending the WXSAT status information for those new to the hobby. As at mid-March, the WXSATs were operating as follows:

NOAA 12 (usually transmits APT on 137.50 MHz) was off, due to the overlap of its footprint with NOAA-15. Both

WXSATs use the same frequency, and NOAA-15 is the prime WXSAT. For those with HRPT (high resolution picture transmission) equipment, transmissions continue as normal, due to the 1700 MHz-band transmissions requiring full tracking facilities – as opposed to the low-gain antennas utilized for APT reception. The orbits of NOAAs-12 and -15 separate during April and transmissions can be expected to resume early in the month.

NOAA-14 transmits good quality APT imagery on 137.62 MHz.

NOAA-15 transmits good quality APT imagery on 137.50 MHz.

Meteor 3-5 usually transmits APT of nominal quality on 137.30 MHz, but is off until its orbital plane has passed through the 'twilight zone' – the night-day terminator in which the spacecraft is continuously illuminated by the sun at a low angle.

Meteor 2-21 is temporarily transmitting APT on 137.400 MHz, but reception is generally poor due to the spacecraft's antenna not having originally deployed fully. Even high elevation passes produce poor quality images.

Okean-0 is a Russian oceanographic resources monitoring satellite that transmits high resolution data in the 8 GHz band, and some APT on 137.40 MHz on occasions when over Russia. Some European WXSAT monitors (including me) have received short transmissions from Okean-O, but these have been infrequent, and none has been received for many months, leading to the suspicion that the satellite is no longer operating.

Okean-4 and **Sich-1** complete this group of oceanographic satellites that sometimes transmit APT briefly on 137.40 MHz.

Resurs 01-N4 transmitted on 137.850 MHz until the failure of its meteorological package.

If you want to receive a continuous flow of WXSAT images, you should find the geostationary GOES WXSATs perfect. Both GOES-8 and GOES-10 use 1691 MHz for WEFAX, and are located over the east and west coasts respectively.

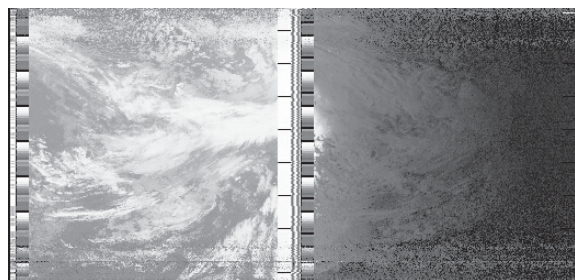


Fig 1: APT from NOAA-14 1709UTC March 6, 2002

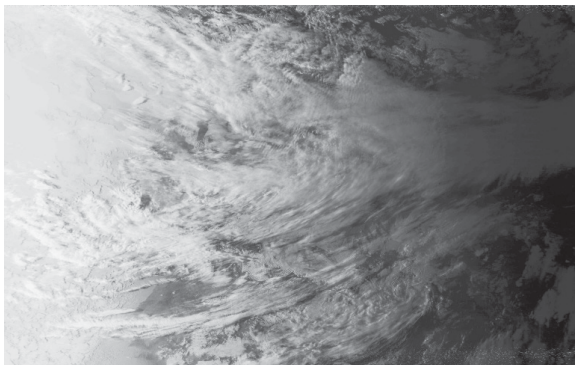


Fig 2: HRPT from same pass

Figures 1 and 2 were obtained from the same satellite simultaneously. Although I have operated an APT reception system for over a decade, I only acquired an HRPT (High Resolution Picture Transmission) system in spring 2000, and often collect both data streams when possible. The APT image shows the two channels – visible-light and infrared. The approach of spring can be seen – the ground on the west (left) of the visible-light channel is progressively illuminated, and within a few months will be in full sunlight. The other picture shows the visible-light channel after enhancement.

❖ Future WXSAT launches

The next scheduled weather satellite launch is NOAA-M (NOAA-17 after launch), currently planned no earlier than June 25th 2002.



All Frequencies MHz

Panamsat Galaxy 10R - C-Band

123 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	Showtime, The Movie Channel, Flix, Sundance Channel (West) / Showtime, The Movie Channel (Mountain) (digital)
6(H)	3820	Data Transmissions
7(V)	3840	TVN / Outdoor Life Network / WE: Women's Entertainment / MusicChoice (digital)
8(H)	3860	Data Transmissions
9(V)	3880	TVN / MusicChoice (digital)
10(H)	3900	(none)
11(V)	3920	Toon Disney East and West / Soapnet East and West (digital)
12(H)	3940	TVN / MusicChoice (digital)
13(V)	3960	TVN Direct / Cable Radio Network / DMX (digital)
14(H)	3980	Showtime HDTV (West) (digital)
15(V)	4000	Showtime - West (VC2+)
16(H)	4020	TV Land - East (VC2+)
17(V)	4040	Nickelodeon - West (VC2+)
18(H)	4060	The Movie Channel - West (VC2+)
19(V)	4080	MTV - West (VC2+)
20(H)	4100	CSPAN-3 / ESPN Classic / ESPNNews / Lifetime Movie Network / Lifetime Real Women / Soapnet / Toon Disney (digital) ESPNNews (VC2+)
21(V)	4120	(none)
22(H)	4140	(none)
23(V)	4160	A&E - West (VC2+)
24(H)	4180	Outdoor Channel (analog and digital)

Panamsat Galaxy 10R - Ku-Band

123 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	Data Transmissions
3(V)	11760	J.C. Penney Business TV (digital) / Data Transmissions
4(H)	11780	Data Transmissions / Analog audio SCPC transmissions 1012.75 87.25 Wal-Mart In-store Network 1013.15 86.85 Sam's Club In-store Network 1013.50 86.50 Wal-Mart In-store Network 1013.95 86.05 Wal-Mart In-store Network 1014.25 85.75 Sam's Club In-store Network 1014.75 85.25 Wal-Mart In-store Network 1015.05 84.95 Wal-Mart In-store Network
5(V)	11800	Data Transmissions
6(H)	11820	University of Washington TV

7(V)	11840	(digital) / KEXP-FM 90.3, Seattle, WA - University of Washington radio station (digital)
8(H)	11860	Data Transmissions Volkswagen Business TV (digital) / Data Transmissions
9(V)	11880	Occasional video
10(H)	11900	Data Transmissions
11(V)	11920	Occasional video
12(H)	11940	Data Transmissions
13(V)	11960	iSKYCOM (KBS, SBS, YTN, WOW, ISC, Radio Korea) (digital)
14(H)	11980	Data Transmissions
15(V)	12000	California Community College Network (digital) / USC Educational TV (digital) / StarNet distance learning (digital)
16(H)	12020	Data Transmissions
17(V)	12040	Occasional video
18(H)	12060	Data Transmissions
19(V)	12080	Occasional video
20(H)	12100	Occasional video
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video

Panamsat Galaxy 5 - C-Band

125 degrees West longitude

1(H)	3720	The Disney Channel - East (VC2+)
2(V)	3740	Occasional video
3(H)	3760	Trinity Broadcasting Network (TBN) 5.58, 5.78 Trinity Broadcasting Network Radio Network 8.00 Trinity Broadcasting Network Spanish-language SAP
4(V)	3780	Sci-Fi Channel (VC2+)
5(H)	3800	CNN (VC2+) 6.30 CNN Radio News 7.58 CNN Radio News
6(V)	3820	Superstation TBS (VC2+) 6.48 Brother Staire Radio - religious
7(H)	3840	Superstation WGN (VC2+) 5.58, 6.12 WCPE-FM 89.7 Raleigh/Durham/Chapel Hill, NC - classical 6.30, 6.48 WFMT-FM 98.7 Chicago, IL - classical 6.80 Yesterday USA (VC2+)
8(V)	3860	HBO - West (VC2+)
9(H)	3880	ESPN (VC2+) 5.80 ESPN Natural Sound
10(V)	3900	Infomercials
11(H)	3920	ABC Family - East (VC2+)
12(V)	3940	Discovery - West (VC2+)
13(H)	3960	CNBC (VC2+)
14(V)	3980	ESPN2 (VC2+)
15(H)	4000	HBO - East (VC2+)
16(V)	4020	Cinemax - West (VC2+)
17(H)	4040	TNT - East (VC2+)
18(V)	4060	TNN - East (VC2+)

19(H)	4080	USA - East (VC2+)
20(V)	4100	Black Entertainment TV (VC2+ and digital)
21(H)	4120	Lifetime - East (VC2+)
22(V)	4140	CNN Headline News (VC2+) 6.30 CNN Radio News 7.58 CNN Headline News Radio
23(H)	4160	A&E - East (VC2+)
24(V)	4180	Showtime - East (VC2+)

Panamsat Galaxy 9 - C-Band

127 degrees West longitude

1(V)	3720	(none)
2(H)	3740	Gospel Music Network (VC2+) 5.40 Truth Radio Network 1 5.80 Truth Radio Network 2 7.28 Genesis Communications Radio Network 7.76 American Freedom Radio Network
3(V)	3760	Occasional video
4(H)	3780	STARZ! - East (VC2+)
5(V)	3800	TBN's Church Channel (digital)
6(H)	3820	(none)
7(V)	3840	(none)
8(H)	3860	STARZ! - West (VC2+)
9(V)	3880	(none)
10(H)	3900	(none)
11(V)	3920	(none)
12(H)	3940	STARZ! Theater - East (VC2+)
13(V)	3960	(none)
14(H)	3980	(none)
15(V)	4000	(none)
16(H)	4020	Encore - East (VC2+)
17(V)	4040	(none)
18(H)	4060	(none)
19(V)	4080	(none)
20(H)	4100	Encore Westerns - East (VC2+)
21(V)	4120	(none)
22(H)	4140	(none)
23(V)	4160	(none)
24(H)	4180	(none)

Loral Skynet Telstar 7 - C-band

129 degrees West longitude

1(H)	3720	TV Espana - broadcast to the Americas (digital) / Triangle TV Network (digital) / WorldLink Television (digital)
2(V)	3740	In-Demand PPV (digital)
3(H)	3760	In-Demand PPV (digital)
4(V)	3780	In-Demand PPV (digital)
5(H)	3800	Hot Zone/Spice/Spice-2/Hot Network / Vivid TV / Playboy (digital) / Spice Platinum (digital)
6(V)	3820	Data Transmissions
7(H)	3840	Television Por Cable (PCTV) (digital)
8(V)	3860	Data Transmissions
9(H)	3880	Television Por Cable (PCTV) (digital) / VideoRola (digital)
10(V)	3900	Occasional video

11(H)	3920	Television Por Cable (PCTV) (digital)
12(V)	3940	Occasional video
13(H)	3960	Occasional video
14(V)	3980	A&E Biography / Lifetime / Do-It-Yourself Network / CNBC World / Independent Film Channel / MuchMusic USA / History Channel / Tech TV (digital)
15(H)	4000	Playboy TV (VC2+) 5.58, 5.76 KLOM-FM 88.1, Long Beach, CA - jazz 6.80 FCC-mandated safe harbor audio 8.30 Cable Radio Network 1
16(V)	4020	The Vision Network
17(H)	4040	HBO HDTV (East and West) (digital)
18(V)	4060	Athena TV (digital)
19(H)	4080	TeleHit / Ritmo Son Latino / Telenovelas / Cinema Golden Choice 1 / Cinema Golden Choice 2 / Unicable / De Pelicula / Bandamax / XEW-TV 2 / XHTV-TV 4 / XHGC-TV 5 / XEQ-TV 9 (digital)
20(V)	4100	Athena TV (digital)
21(H)	4120	America's Collectibles Network (ACN)
22(V)	4140	B-Mania Channel / FamilyNet / TV Warehouse / TV Super Store (digital)
23(H)	4160	Athena TV (digital)
24(V)	4180	Video Italia (digital)

Loral Skynet Telstar 7 - Ku-band

129 degrees West longitude

1(V)	11720	Starband Internet (digital)
2(H)	11740	Occasional video
3(V)	11760	Edward Jones Business TV (digital)
4(H)	11780	Starband Internet (digital)
5(V)	11800	Starband Internet (digital)
6(H)	11820	Starband Internet (digital)
7(V)	11840	Occasional video
8(H)	11860	Starband Internet (digital)
9(V)	11880	Starband Internet (digital)
10(H)	11900	Data Transmissions
11(V)	11920	Data Transmissions
12(H)	11940	Occasional video
13(V)	11960	Occasional video
14(H)	11980	Starband Internet (digital)
15(V)	12000	Occasional video
16(H)	12020	Starband Internet (digital)
17(V)	12040	Echostar Philadelphia locals (digital)
18(H)	12060	Starband Internet (digital)
19(V)	12080	Data Transmissions
20(H)	12100	Occasional video
21(V)	12120	Data Transmissions
22(H)	12140	Occasional video
23(V)	12160	Data Transmissions
24(H)	12180	Starband Internet (digital)

SNOTEL Data Collection Network

Photos and graphics courtesy of NRCS

Recently I have had several queries regarding the data signals that scanner enthusiasts are hearing on 40.530 and 41.530 MHz. These signals are part of a very special government radio network known as SNOTEL (SNOWpack TELEmetry).

The Natural Resources Conservation Service (NRCS), a bureau under the Department of Agriculture, installs, operates, and maintains this extensive automated system to collect snowpack and related climatic data in the Western United States.

Garry Schaefer from the NRCS passed along detailed information on system operation to David Gordon, KB4LCI, a couple of years ago. Here is what Garry provided David that was posted to the VHFskip newsgroup in 1999.

"Meteor communications was discovered by the military in the 1950s, but really didn't get off the ground until the Natural Resources Conservation Service (NRCS) began to explore what method was the most cost effective to use for automated weather stations to send their data back to a central point. Contractors began looking at the various technologies in early 1970. They looked at line-of-sight systems, satellite, and meteor burst. The one that we choose was meteor burst. So, in 1975, the system began to take shape, and in 1976, the first SNOTEL data was transmitted using meteor burst communication.

"NRCS owns and operates two master stations which act as central receiving stations. Only one is required, but because of the critical nature of the information that SNOTEL provides to its users, two were installed for redundancy purposes. Each master station is able to communicate with up to 3,000 remote sites within a radius of 1,000 miles. Once the master station receives the data, it is forwarded via landlines to Portland, OR, and made available. Currently, SNOTEL has over 650 remote sites in twelve western states.

"SNOTEL uses two frequencies; 40.530 and 41.530 MHz. Our output power from the master stations is around 1500 watts. The remote sites transmit on 41.530 MHz at about 100 watts. The remote site transmitter is only on for about 0.1 seconds. The master station transmitters are always on and must establish the link between the master station and remote site. Alaska has its own meteor burst master station and the data from it are delivered to Portland.

"Using meteor burst communication was the cheapest method for us to use, plus it is totally under NRCS control. If we want data, we don't have to wait for three to six hours for the satellite (GOES) to acquire the remote sites' data. With meteor burst, we can reliably get hourly data from most geographic areas, whereas GOES needs to

have a clear view toward the south. That means that if we wanted to put a site down in a canyon where the southern skyline was obscured, we couldn't get data out using GOES, but can with meteor burst.

"We use two types of encoding, a 90 degree FSK for the first ~ 10 seconds of each minute, then a 30 degrees FSK for the rest of the minute. We do this to allow our two types of meteor burst radios to work.

"If you would like to access additional information, please visit our web site at <http://www.wcc.nrcs.usda.gov>."

Other Known Government Meteor Burst Systems

40.130	US Air Force (paired with 41.930)
40.470	Department of Energy (paired with 41.670)
40.690	Bureau of Land Management Alaska (paired with 41.770)
41.670	Department of Energy (paired with 40.470)
41.770	Bureau of Land Management Alaska (paired with 40.690)
41.930	US Air Force (paired with 40.130)
46.610	Department of Energy (paired with 49.770)
46.900	U.S. Coast Guard (paired with 49.930)
46.960	A Canadian experimental system has been reported here
49.730	An unknown meteor burst system has been reported here
49.770	An unknown meteor burst system has been reported here
49.870	Department of Energy (paired with 46.610)
49.930	U.S. Coast Guard (paired with 46.900)

If any of our readers have discovered other meteor burst systems in this band, please contact us at the email address in the masthead.

United Nations Communications

I have also had several requests in recent months to present information regarding United Nations communications systems in New York City. For those who requested that information, here is what I have in my files regarding the UN. Any additions or corrections are certainly welcomed.

Frequency (MHz)	Usage
165.6125	UN Security Simplex
165.7125	UN HQ Paging Simplex
166.1000	UN Security Simplex
170.5750	UN International School Security Paging Simplex
409.625/407.200	DOS Office of Security Protection (Repeater output/input)
409.700/408.100	US UN Ambassador Alpha (Repeater output/input)
409.150/408.600	DOS Law Enforcement (Repeater output/input)
416.425	UN Building Maintenance Simplex

FHWA HF Emergency Communications System

Linking regional and field offices nationwide, the Federal Highway Administration (FHWA) HF Emergency Communications System (ECS) is intended to keep Department of Transportation officials informed of major occurrences, accidents and catastrophes involving the nation's highways.

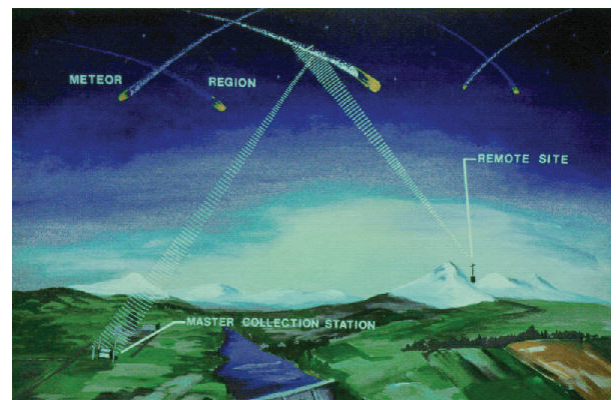
Practice drills by this agency have been observed in the past during the months of March, June, September and December from 1700-2131 UTC, Wednesday and Thursday. Various government agencies have participated in these drills such as SHARES members and other DOT agencies, including the FAA and Office of Emergency Transportation (OET).

There is a Region 7 FHWA net that starts at 1000 ET every Wednesday using the following times and frequencies:

Time(H + min)	Freq (Desig)	Freq (kHz)
H + 00	F-14	4821.0
H + 10	F-23	5755.5
H + 20	F-28	7743.0
H + 30	F-31	9185.0
H + 40	F-35	11045.0
H + 50	F-42	13434.0
H + 60	Net Terminated	

Here is a list of the known FHWA ECS network frequencies and their designators.

3199.5	F-1	3304.5	F-10
3329.5	F-11	3395.0	F-12
4572.5	F-13	4821.0	F-14
4902.0	F-16	4965.0	F-15
5024.5	F-17	5031.0	F-18
5255.0	F-2	5330.0	F-19
5350.0	F-20	5424.0	F-21
5749.0	F-22	5755.5	F-23



5885.0	F-24	7419.0	F-3
7669.5	F-25	7726.5	F-26
7736.0	F-27	7743.0	F-28
7743.0	F-28	7821.0	F-29
9169.0	F-30	9185.0	F-31
9197.0	F-4	9918.0	F-?
9930.0	F-32	10225.0	F-33
10891.0	F-5	10918.0	F-34
11045.0	F-35	11518.7	F-36
11605.0	F-37	12064.5	F-38
12094.5	F-39	12158.0	F-6
12171.0	F-40	12178.7	F-41
13434.0	F-42	13493.0	F-43
14461.0	F-7	14593.0	F-44
15910.0	F-45	15969.0	F-46
15981.0	F-47	16211.5	F-8
16330.0	F-48	17525.0	F-49
18403.0	F-50	18716.0	F-51
19223.0	F-9	19934.0	F-52
20095.0	F-53	20330.0	F-54
20843.0	F-55	22926.0	F-56
22975.0	F-57	24040.0	F-58
24793.0	F-59	25490.0	F-60
26703.0	F-61	26905.0	F-62

◆ The Fed Files Mail Call

MT reader George M. Kupraszewicz in Detroit, Michigan, passes along the following list of federal frequencies he is monitoring in his area.

162.7125	U.S. Marshal Service/Federal Courts (KRD 232) CTCSS 203.5 Hz
162.7875	U.S. Marshal Service City Repeaters and simplex CTCSS 127.3 Hz
163.6250	U.S. Border Patrol Simplex
163.8125	U.S. Marshal Service Admin and Operations Repeater CTCSS 127.3 Hz
164.9625	U.S. Postal Service — Detroit Main Post Office
165.2875	Alcohol, Tobacco and Firearms (ATF) Channel 1 Tactical CTCSS 103.5 Hz
168.3500	General Services Administration (KPA 717) Simplex
413.7000	U.S. Border Patrol (KQA 700)
414.7500	U.S. Postal Service — Detroit Main Post Office Inspectors Channel 1
415.2000	General Services Administration (KPA 717)

Norman W. Hill in Arlington, Virginia, sends along some federal monitoring he has done from



A SNOTEL remote data collection site

his area, a suburb of Washington, D.C.

162.2500	U.S. Capitol Police Channel 4/9 (Repeater/simplex)
162.6125	U.S. Capitol Police Channel 5/10 (Repeater/simplex)
164.8625	Federal Police Agencies
165.5375	U.S. Capitol Police Channel 2/7 (Repeater/simplex)
165.6875	Federal Police Agencies Mutual Aid [Washington Field office for Secret Service-LVH]
166.7250	U.S. Park Police Channel 1/6 (Repeater/simplex)
166.9250	U.S. Park Police Channel 2/7 (Repeater/simplex)
167.0250	U.S. Park Police Channel 3/8 (Repeater/simplex)
169.2250	U.S. Capitol Police Channel 1/6 (Repeater/simplex)

Mike Crenshaw in LaGrange, Georgia, has been doing some fed monitoring in his area. Here is his report.

163.4125	US Army Corps of Engineers West Point Lake, GA, Repeater output/Channel 3
163.4375	US Army Corps of Engineers West Point Lake, GA, Simplex/Channel 1
164.2000	US Army Corps of Engineers West Point Lake, GA, Simplex (and input to 163.4125 repeater)
415.2000	DEA Repeater
418.6250	DEA Channel 1
418.6750	DEA Channel 4
418.7500	DEA Channel 5
418.8000	DEA Simplex
418.9500	DEA Repeater

And finally, Mac in Virginia has one frequency to share from his area: 166.035 MHz, callsign Watch Dog, for the CIA training facility at Camp Peary, Virginia.

Many thanks to all our contributors for this edition of *The Fed Files* Mail Call.

◆ VHF Low Band Skip Intercepts

Solar cycle 23 continues to surprise and amaze radio hobbyists who prowl the VHF low bands for long haul reception opportunities. Recently we did some VHF low band monitoring here at the MT offices here in Brasstown and here are some of the signals we heard.

30.450	US Army — Fort Hood Range Control, Texas
34.850	US Army — White Sand Missile Range, New Mexico Land Air Net 1 (looks like it is paired with 34.310)
36.330	Department of Energy — Nevada Test Site
36.390	Department of Energy — Nevada Test Site
36.510	US Army — White Sand Missile Range, New Mexico Contractor Support
36.950	US Army — Ft. Hood Tower, Texas
38.300	US Army — Pohakuloa Training Area Range Control (Schofield Barracks), Hawaii
38.350	US Army — Butts AAF, Ft. Carson Colorado
38.600	US Marine Corps — Camp Lejeune, North Carolina Blackburn Range Control
38.800	CANFORCE Military Discrete
38.900	US Army — Ft. Campbell, Kentucky Range Control
	US Army — Ft. Irwin, California Range Control
40.330	Bureau of Indian Affairs — Western United States
40.530	Department of Agriculture — SNOTEL Data System
41.530	Department of Agriculture — SNOTEL Data System

And that wraps up this month's edition of *The Fed Files*. I would like to thank all our contributors for the information they have shared with our MT readers. Until next month, 73 and good hunting.

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How Radio Frequencies are Assigned

The lifeblood of any trunked radio system is clear and reliable access to enough frequencies to support the mission of the system owner. Getting and keeping those radio frequency assignments for public safety use often involves several public and private organizations. This month we'll take a look at the process for assigning frequencies to public safety users and hopefully provide some relevant information for those of you writing letters to your local governments about proposed radio systems.

In the United States, the Federal Communications Commission (FCC) controls radio frequency assignments for non-Government use. Historically, the FCC has divided up the available frequencies into different groups and assigned them to a specific use (*as MT is documenting in our ongoing "Who's Who in the Spectrum" series - ed.*). For instance, a large set of frequencies in the VHF (Very High Frequency) and UHF (Ultra High Frequency) ranges are assigned to over-the-air television broadcasters. Cellular telephone and PCS service providers have their own set of frequencies in the 800 MHz (megahertz) and 1.9 GHz (gigahertz) range.

◆ Public Safety Radio Pool

The FCC has reserved several blocks of frequencies for exclusive use by public safety agencies. While we often think of these agencies as police, fire and emergency medical services, under current FCC rules a wide variety of organizations and individuals qualify to use these frequencies. By showing that they provide some type of public safety mission, whether through a letter from a government official or operation as a non-profit organization, they can be assigned frequencies from this Public Safety Radio Pool.

Some qualifying organizations and individuals include veterinarians, animal hospitals, persons with disabilities, funeral director associations, disaster relief organizations, blood banks, heart and lung centers, school bus services and boards of education, botanical gardens, departments of agriculture and environmental resources, beach patrols, retirement facilities and homes for the aged, mental health institutions, rehabilitation centers, electric power cooperatives, state reservations and tribal councils, universities, water control boards, and emergency repair services for public communications facilities.

◆ Frequency Bands

There are five primary bands that make up the Public Safety Radio Pool:

Low-Band VHF	30 MHz to 50 MHz
Mid-Band VHF	72 MHz to 76 MHz
High-Band VHF	138 MHz to 144 MHz 148 MHz to 174 MHz 220 MHz to 222 MHz
Low-Band UHF	406.1 MHz to 420 MHz 450 MHz to 470 MHz 470 MHz to 512 MHz
800 MHz Band	806 MHz to 824 MHz 851 MHz to 869 MHz

The 800 MHz band includes the nationwide common-use frequencies specified by the National Public Safety Planning Advisory Committee (NPSPAC):

ICALL	Calling	866.0125
ITAC-1	Mutual Aid #1	866.5125
ITAC-2	Mutual Aid #2	867.0125
ITAC-3	Mutual Aid #3	867.5125
ITAC-4	Mutual Aid #4	868.0125
STAC-5	Portable/Mobile	868.7875 (low power)

In addition, the 700 MHz band is scheduled to become available in 2006 after the current occupants, UHF television broadcasters, finally vacate the band and move to their new digital TV frequencies. The assignments from 764 MHz to 776 MHz and from 794 MHz to 806 MHz are reserved for public safety use.

◆ Frequency Assignment Process

Let's walk through the process for a fictional place we'll call Middletown. Middletown has been using two frequencies on conventional, low-band VHF radios for the past twenty years or so, and during that time the town has grown from a handful of police officers and a small volunteer fire department to several dozen officers and three fire stations. Surrounding communities have also grown, as has the demand on county services.

The Middletown radio system is overloaded. When the system was first put together during the Carter Administration, one frequency was assigned to the police force and the other to the volunteer fire department. Because of the one-department-one-frequency assignment, when one police officer is speaking all the others have to wait. This worked fine for many years, but as the department grew the amount

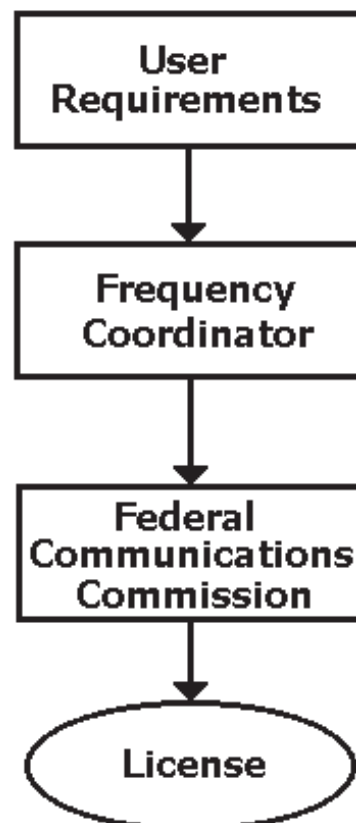
of radio traffic during busy periods eventually outgrew the capacity of the single frequency. And now when there's a fire, the fire department has constant traffic on their frequency and there are significant delays for firefighters trying to get messages to each other.

In addition, after more than twenty years most of the original equipment is obsolete and nearly impossible to maintain or repair.

After approval from the town council, Middletown issued an RFP (Request for Proposal) to several consulting firms with experience in designing public safety radio systems. After a review and selection process, the town contracted with a nearby engineering company.

◆ System Requirements

The first step in applying for frequencies is to figure out exactly what to ask for. The users need to define their communications requirements, answering such questions as, which departments and how many users will be on



the system? How often will they communicate, and to whom do they need to talk? What kind of geographic coverage do they need? Will other agencies and towns also share the system? Equally important, what kind of budget is available for such a system?

Another choice to be made is whether to operate as a conventional system where users are assigned to a specific frequency or as a trunked system where all of the frequencies are shared among all the users.

Trunking is a better way to go for large systems, since the available frequencies are used more efficiently than in conventional systems. This means that the same number of frequencies can serve more users in a trunked system than in a conventional system. Trunking also provides faster access time and is easier to expand as new users join the system. On the other hand, trunked systems are much more expensive than conventional systems, and they require more training to operate and maintain.

◆ Frequency Coordinator

One of the particulars about the system are known, Middletown and the engineering company will put together a request and sent it to an organization known as a *frequency coordinator*. Their job is to recommend a set of available frequencies that meet the needs of the applicant but don't conflict with other users. The

FCC has approved four frequency coordinators for the Public Safety Radio Pool: American Association of State Highway and Transportation Officials (AASHTO), Association of Public Safety Communications Officials International, Inc. (APCO), Forestry Conservation Communications Association (FCCA) and the International Municipal Signal Association (IMSA). Each of these coordinators is responsible for a part of the Public Safety Radio Pool, depending upon the band and the intended use of the frequencies.

In addition, if the system is expected to operate in the 800 MHz band, the National Public Safety Planning Advisory Committee must also review and approve the frequency recommendation.

◆ Radio Signal Propagation

One major criterion in the selection of frequencies is the effect it has on range. Each agency has a particular geographic area in which they need solid radio coverage, and the choice of radio frequency will affect how that coverage will be achieved.

In general, with all other things being equal, lower frequency radio signals travel farther than higher frequencies. Higher frequencies are also more affected by the local environment, including natural and manmade obstructions. In order to provide complete coverage, higher frequencies usually require more repeaters and antenna towers. This adds to the cost of the system, since each tower needs equipment, maintenance, permits, fees, and so on. On the other hand, higher frequencies need shorter antennas, so vehicle mounts and portable radio units are much more convenient at higher frequencies.

The selected frequencies should also match the type of environment an agency is expected to work in. An urban area will have a number of tall buildings, a large population base requiring a large number of radio system users, and a lot of mobile activity. In order to achieve a high level of coverage inside buildings, the system may need to incorporate a larger number of repeater sites that cover smaller areas. Frequencies in the 800 MHz band may work well here, especially since trunked systems can more efficiently support such a large number of users. The risk is that planners may neglect to provide for a sufficient number of repeater sites, leading to gaps in coverage – the so-called “dead zones” that many large cities are currently experiencing with their new 800 MHz systems.

Rural areas will usually have a few areas with small buildings and a large geographic area to cover. There are also fewer users on the system. In these instances it might be a better choice to use lower frequencies on a conventional system, since the lower cost and greater range are a good match for the operating requirements.

Suburban agencies fall somewhere in-between. They typically have smaller buildings and are more geographically dispersed but may have a large number of radio system users.

◆ Inter-coordination

Once a frequency band has been selected, the coordinator chooses appropriate frequencies that are unlikely to interfere with existing systems. In addition, if the chosen frequencies are adjacent to frequencies handled by another coordinator, the application may be reviewed a second coordinator. There is an organization called the Public Safety Communications Council (PSCC), made up of representatives from each of the four frequency coordinators, which will make such applications available for review and possible objection.

The frequency coordinator also reviews the application to be sure the agency is qualified, both technically and financially, to operate such a system. The FCC requires that the coordinator finish their work within 20 business days and submit the application package.

◆ FCC Approval

After the frequency coordinator has approved the application, it is submitted to the Licensing and Technical Analysis Branch of the FCC in Gettysburg, Pennsylvania. From there the FCC will coordinate the frequency use with other federal agencies and possibly other national governments (such as Canada and Mexico). Once those hurdles are cleared and everything is in order, including the payment of any required fees, the license is granted and the system can be put on the air.

The FCC is also responsible for making sure that the license holders are acting appropriately and legally under the conditions and restrictions of their license. Since the FCC is not actively monitoring every license holder, they usually get involved only after a complaint has been filed. Resolution of interference issues, one of the most common complaints, has become a hot topic recently because of widespread interference to public safety systems from Nextel's Specialized Mobile Radio (SMR) operations. You can read more about that in the *Tracking the Trunks* column from February.

Once the FCC approves the Middletown application, they may begin operation. They will have to renew their license every five years and keep the FCC informed about any changes or additions to their system.

◆ Dayton HamVention

As an unrelated plug for one of my favorite radio events, May means that the annual Dayton HamVention is right around the corner. The events begin this year on Friday, May 17 and run for three days at the Hara Arena in Dayton, Ohio. More than 500 indoor exhibitor spots and 2,500 outdoor vendor spaces are full of new products, used equipment, and bargains of all kinds. Besides the three-day hamfest itself, the Dayton area offers several other attractions including an aviation museum at nearby Wright-Patterson Air Force Base and the Aviation Trail/Wright Cycle Company. You can check out all of these things from the HamVention website at <http://www.hamvention.org>.

That's all for this month. More information is available from my website at <http://www.signalharbor.com> and I welcome your electronic mail at dan@signalharbor.com. Until next month, happy monitoring!



The Kenwood TK-360 is a four-channel conventional radio operating in the VHF band.

NORAD Combat Air Patrols (CAP)

In the aftermath of the 9-11 attack on New York and Washington, nothing has generated more mail in the Milcom world than the NORAD Combat Air Patrols (CAP) being flown over the United States. In this month's column I will share some of that mail and information with you on what has been discovered about these fascinating military missions being flown over the New York and Washington DC areas.

◆ The NYC/DC CAPS

MT Reader James Condon from Stockholm, New Jersey, has spent a considerable amount of time listening to the Washington DC/New York City combat air patrols. Here is his list of active frequencies and callsigns heard. All reception was in the AM mode, all frequencies in Megahertz (MHz). Comments in italics are from the column editor.

138.100	VHF USAF air-to-air
138.425*	VHF USAF air-to-air
138.875	McGuire AFB tanker interplane
141.800	VHF USAF air-to-air
256.900	103FW/118FS air-to-air discrete Bradley Intl Airport, CT
271.000*	Huntress-NE ADS and NORAD Air Defense air-to-ground (Nationwide)
285.500	Washington ARTCC discrete
288.400*	Huntress-NE ADS and NORAD Air Defense air-to-ground (Nationwide)

299.700	US Navy/FAA assignment
306.300	FAA ARTCC assignment
309.500*	Huntress-NE ADS and NORAD Air Defense air-to-ground
318.400	Huntress-NE ADS and NORAD Air Defense air-to-ground
320.900	Aerial Refueling
324.000	Huntress-NE ADS and NORAD Air Defense air-to-ground (Nationwide)
341.750	USAF AWACS Have Quick/ Time of Day discrete (Nationwide)
353.500	FAA ARTCC assignment
362.300*	FAA ARTCC assignment/Comms with CAPs
381.600	FAA ARTCC assignment
385.500	FAA ARTCC assignment

* indicates the most active

According to James, 271.000 and 362.300 MHz seem to be the primary frequencies used by the CAPs. They have been active 24 hours a day, 7 days a week since the 9/11 attacks. The 138 and 141 MHz frequencies have been used as air to air discrete frequencies between fighter patrol aircraft during their flights and James has overheard some interesting conversations. At times, some of the transmissions use secure encryption modes.

The following callsigns have been heard and usage listed per Gayle Van Horn's *International Callsign Book*.

Callsign	Usage
Bandsaw	E-3B/C AWACS/OK, 552ACW/964AACS, Tinker AFB, OK Backend Battlestaff
Bater # #	Unknown

Brave # #	DC ANG 113FW Andrews AFB
Bullseye # #	Unknown
Crow # #	Eglin AFB F-15 aircraft
Devil # #	Michigan ANG 127 Wing Selfridge ANG B F-16 aircraft and New Jersey ANG 177FW Atlantic City callsign
Dustoff # #	Has been associated with US Army helicopters in the past.
Gator # #	Shaw AFB F-16 aircraft
Goliath	E-3B/C AWACS/OK, 552ACW/960AACS, Tinker AFB, OK Backend Battlestaff
Hightop # #	KC-135 tanker for fighter aircraft
Huntress	NE Air Defense Sector, Rome, NY
Magic # #	NATO E-3 AWACS aircraft
Redskins # #	Unknown [The Washington DC CAP has been referred to as the Redskins CAP by participants. This could be what you heard, James-LVH]
Snake # #	F-16 aircraft
Spad # #	1FW Langley AFB F-15 aircraft
Tusk # #	Unknown

James' station consists of the following: Icom R7000 connected to a Grove SDU-100 Spectrum display unit and a Radio Shack PRO-2045. Both receivers are connected to a discone antenna on top of a 75 foot tower through an RF preamp. He uses the R7000 and SDU-100 are used to find the active frequency's and they are then programed into the PRO-2045.

James, thanks for forwarding your observations on the current milair situation in your area and sharing them with our MT readers.

Additional Northeast NORAD CAP Info

Huntress/Pyramid/Push Pull — NE ADS, Rome, NY
228.900 254.200 260.900 271.000 277.600 288.400
309.500 364.200

AWACS to tanker comms

318.400 324.000 355.200

127.275	113FW Andrews AFB
138.000	119FW Hector IAP air-to-air
138.250	177FW Atlantic City air-to-air
138.425	177FW Atlantic City air-to-air
139.725	148FW Duluth IAP air-to-air
141.875	192FW Richmond IAP air-to-air
142.450	177FW Atlantic City air-to-air
143.800	115FW Dare County Reg Airport/Truax Field air-to-air
143.875	115FW Dare County Reg Airport/Truax Field air-to-air (Philly CAP) Also used by Gator c/s aircraft from Shaw AFB when on CAP duty.
276.675	1FW/71FS discrete Langley AFB, VA
287.000	NYC CAP tanker frequency
357.100	1FW/71FS discrete Langley AFB, VA
360.150	CAP air-to-air discrete



Photo credit, DoD

364.150 Possible CAP on-station air-to-air

Other callsigns monitored in conjunction with CAPs

Bash ## Virginia ANG 192FW Richmond IAP F-15 aircraft
Bicep ## New Jersey ANG 177FW Atlantic City IAP F-16 aircraft
Chalice 552ACW/963AACS Tinker AFB, OK E-3 AWACS aircraft Backend Battlestaff
Darkstar 552ACW/965AACS Tinker AFB, OK E-3 AWACS aircraft Backend Battlestaff
Gino ## KC-135 refueling AWACS aircraft
Gorner ## KC-135 refueling AWACS aircraft
Hightop ## Tanker support for CAP fighter aircraft
Kong ## Eglin AFB, FL F-15 aircraft
Malta ## Tanker support for CAP fighter aircraft, even mission numbers are Pease tankers and odd numbers are Bangor tankers
Polar ## Minnesota ANG Duluth IAP F-16 aircraft
Refueler ## Tanker support for CAP fighter aircraft
Rubber ## Tanker support for CAP fighter aircraft
Scout ## 513ACG/970AACS Tinker AFB, OK E-3 AWACS aircraft front end flight crew
Sentry ## E-3 AWACS front end flight crews with breakdown to units as follows:
Sentry 1# 18 Wing/961AACS Kadena AB, Okinawa
Sentry 2# 3 Wing/962AACS Elmendorf AFB, AK
Sentry 3# 552ACW/963AACS Tinker AFB, OK
Sentry 4# 552ACW/964AACS Tinker AFB, OK
Sentry 5# 552ACW/965AACS Tinker AFB, OK
Sentry 6# 552ACW/966AACS Tinker AFB, OK
Thumper 513ACG/970AACS Tinker AFB, OK E-3 AWACS aircraft Backend Battlestaff
Timer ## Wisconsin ANG 115FW Dare County Reg Airport/Truax Field F-16 aircraft
Vader ## North Dakota ANG 119FW Hector IAP F-16 aircraft

A special thanks goes out to Ron Perron for his input on the DC area CAP in preparing this section.

◆ El Centro 2002 Airshow Report

Regular *MT Milcom* reporter Mark Zurovski attended the 2002 El Centro Airshow and files this nice report on what he heard.

"Spent a beautiful three days down 'Where the Sun spends the Winter' and saw what I think was one of the Blue Angels' better performances; they had some interesting variations on their routines. The crowd at this year's show was noticeably larger than last year and the crowd line was moved back up to where it usually is. Security was numerous and visible, both military and civilian. Backpacks were allowed after a search (I had three scanners, my Scout, binocs, camera and a few lenses – no problems with any of them) and after passing through a hand held metal detector you were good to go.

"The following is my offering for what was in use on Friday and Saturday. Lots of FM in use, most familiar, some new ones and one correction from last year."

138.575 Public Works/Facilities maintenance, lots of work on the public address system on Friday. Show-related maintenance on Saturday. (Found with Pro-26 search)
138.925 Data of some kind, about every 15 or so seconds. (Found by my Scout)
139.550 Line maintenance frequency. (Found with Pro-26 search)

139.600 Input to 141.150
139.800 Medical/ambulance dispatch
140.025 Motor transport dispatch
140.300 POL dispatch
140.525 Medical tactical. (Found by my Scout.)
140.900 Airboss, Groundboss, and Showboss. A very busy frequency.
141.150 Military Police dispatch. Crowd and parking control. 'El Centro One.'
142.800 Public Affairs Officer net. VIP accommodations.
143.700 Miscellaneous. Food and water breaks for the vendors.
148.3500 Military Police tactical. 'El Centro Two.'
154.540 POL for the aircraft, the people actually pumping the gas. (Found by my Scout.)
410.950 Data, again about every 15 or so seconds. This is the one I think I need to correct. My notes from last year indicate 410.15 as having data of some kind on it. My Scout found .95 this year and I am willing to bet it was .95 last year also, sorry about that. FYI 138.925 and 410.95 were not transmitting simultaneously. The 'data' lasts about 1 second.

Mark also reports, "some interesting frequencies heard Friday morning from Silsbee Road, just east of runway 12/30. Sounded like Yuma's Harriers were busy Friday morning, several of these are from a frequency card I found at last year's show. Call signs only when heard."

120.375 Shade Tree Control. Several civilian performers practiced their routines on Friday in one of the restricted areas just north of the field and they were given range entry here.
122.475 The Squirrel Cage practicing their routine Friday morning north of the field.
123.475 Golden Knights jump frequency on Friday. They were also jumping somewhere north of the field.
236.450 Tactical chat.
269.700 Tactical chat. (VMA-214 Base)
274.000 Yuma range control. Busy for most of Friday.
272.900 Lots of tactical chat here for most of Friday.
281.900 Tactical chat. (VMA-214 Tac-3)
293.100 Tactical chat. (VMA-311 Tac-1)
299.500 Tactical chat. (This one is a fairly common discrete, VMA-214 Tac-2)
305.000 Loom Lobby
318.925 Tactical chat. (VMA-513 Tac-2)
321.850 Tactical chat. I heard this one all the way up in Ventura last week.
382.925 Tactical chat. (VMA-513 Tac-1)

Mark indicated that for Friday's practice and Saturday's show the standard published tower and ground frequencies were used, along with the following:

122.825 Performer discrete. Used by a couple of the civilian performers for pilot/narrator comms.
123.150 Air show discrete, used by all performers except the Blues, including Spirit 81. Show coordination.
123.500 Golden Knights Saturday show jump frequency.

And from the frequencies for the Blue Angels published in the March *MT Milcom* column, Mark notes the following were used on Friday and Saturday:

164.900 In use several hours before the show for chat, show coordination and minor maintenance on the jets. Cockpit checklists and four jet taxi out-in.
170.900** Comm cart. Brief weather reports, show coordination.

263.350 In use before the show for minor maintenance of the jets, four jet formations off show center. Ground critiques of four jet formations after they passed show center.
263.350 Used Friday only for four and five jet formations off show center.
275.350 Fat Albert demo comms.
307.700 Show center for solos, four, five and six jet formations. Used by five and six jet formations off show center. Used by jets #1-4 during taxi out-in.
345.900 Solo's taxi out-in, solo's off show center, ground critique of solo passes.

Note: ** The 170.900 MHz frequency was in use early Friday a.m. by someone, not sure who. Sounded like it was some type of secure communications. This activity stopped around noon and picked back up around 2000 local. Same thing on Saturday.

MT reader Fred Pena also attended this air show and confirmed the information above sent by Mark.

Finally, Mark passes along a frequency uncovered by his Scout frequency counter. Mark stated, "I am not sure what it was used for. I checked the Scout twice during the show and found these hits after the show was essentially over."

382.313 with 9 hits
382.303 with 1 hit
382.292 with 2 hits
382.329 with 7 hits

"382.300 MHz was definitely in use for something, my guess would be the F-16 demo team from Hill AFB, Viper West. My Scout did capture all of the frequencies used by the Blues during their show, so it is not inconceivable it found the F-16 aircraft."

As an addendum to Mark's fine report I must add that 382.300 MHz is one of my infamous spectrum holes. An "LVH spectrum hole" are those frequencies that have never had any activity reported on them or any assignment noted in any official government/military frequency documents. Mark, your 382.300 MHz bears real close watching.

I would like to thank Mark and Fred for passing along their excellent reports and encourage others who visit air shows this year to let us know what you heard. You can reach us at the email address in the masthead.

So until next time, 73 and good hunting to all.

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Radio Shootout

Newcomers to domestic-band DXing want to know: what's the best radio? Even if price is no object, there are a wide variety of opinions. I recently spent a few hours comparing reception on several wildly different radios.

The radios in question: a Kenwood TS-940 ham rig connected to a 400-foot "Beverage-on-ground" antenna, pointed west; a Kenwood TS-680 connected to a Force 12 C3 triband (shortwave) Yagi antenna; the factory radio in a 1998 Ford Escort; a Technics ST-G50 hi-fi stereo tuner; a Sony WM-F12 "Walkman" portable; a Radio Shack DX-351; a Grundig YB-400PE; and a Sony ICF-2010. Except for the ham rigs, the built-in antennas were used.

Six AM stations were chosen to test the ability of these radios to pull stations out of the noise, and separate them from stations on adjacent frequencies. WLW-700 (250 miles), KMOX-1120 (230 mi.), and WSAI-1530 (also 230 mi.) were selected to test sensitivity. Selectivity was tested with WCRV-640 (185 mi.) and WMJL-1500. (84 mi.) WNAH-1360 (23 mi.) was chosen to test the ability of receivers to "null" unwanted signals. All tests were conducted between 9:30 and 10:30 a.m.

The **TS-940** was the most expensive rig of the bunch. It was to some degree handicapped by the antenna, which could not be rotated to null unwanted signals. WCRV could be heard under the "splash" from WSM-650, but not very well. Even selecting lower sideband didn't help much. WLW suffered from splash from 250-watt WFCM-710, 42 miles away. This was probably mostly because the antenna doesn't favor signals from the east. KMOX, on the other hand, was better on this radio than on any other combination. WSAI was fair, but with quite a bit of interference from WDAP-1530 in West Tennessee. (Again, to be expected with an antenna that favors the west.) WMJL was also excellent on this radio, as long as lower sideband was selected to escape the WLAC interference.

A non-directional antenna made a big difference on the **TS-680**. WLW was in the clear, no interference, though a bit noisy. WCRV was fair, though with some WSM splash. (Surprising, as the TS-940's antenna should have favored signals from the west.) KMOX nearly vanished; you could tell there was a station there, but none of the speech was understandable. WSAI was fair, again with interference from WDAP. And WMJL was poor, due to interference from an unidentified country station, probably WDEB 120 miles to the east.

The **car radio** was tested with the engine off. Turning it on didn't

seem to make much difference, though other makes/models of car will probably result in a very different experience. Again, the lack of a directional antenna was obvious. You could tell there was a station on 640 under the WSM splash, but there was no way to understand what was being said. WLW was weak, noisy, and suffered from interference from WFCM. KMOX was audible, but just barely; interference from WYXE-1130, 36 miles away, was severe. WMJL? Not even a hint under WLAC. WSAI and WDAP were about equal strength – very weak, just barely audible.

My **Technics** tuner has been a real DX machine for FM. It doesn't do nearly so well on AM. 640 was just barely audible, even though it was possible to null WSM's signal by moving the antenna. WLW and WSAI were poor in the noise, and KMOX completely non-existent. WLAC-1510 couldn't be nulled at all, and that meant not even a hint of WMJL. Rotating the antenna could reduce the strength of WNAH considerably, but it couldn't eliminate the WNAH signal altogether.

Radio Shack was closing out the **DX-351** a few years ago, at a pretty good price. I picked one up for no good reason. This is not a DXers' radio... The dial calibration of this analog receiver was way off, making it difficult to know what I was listening to. WLW, KMOX, and WSAI could not be heard at all, despite being on clear frequencies. WMJL was also gone, in their case due to splatter from WLAC. Surprisingly, WSM could be nulled deeply enough to clear up 640 and allow WCRV to come through. But the WCRV signal was so weak as to be unidentifiable.

The **Sony Walkman** was even worse (as you might imagine). The dial calibration was a bit better, but the tuning rate was way too fast. The only one of the distant stations that could be heard was WCRV, and that just barely. WNAH could be nulled by about 20dB – probably enough to get some DX at night.

With the **YB-400**, we're beginning to see some DX ability again. WCRV was fair copy, though WSM interference was still a problem. WLW was totally in the clear. KMOX came in as very weak flutter. WLAC could be almost nulled, but no WMJL was present. WSAI provided a

barely-audible signal, but with no interference. And WNAH could be nulled into the noise, opening the channel for DX.

Finally, the **ICF-2010**. WCRV's signal was better on this radio than any other. WSM could be nulled deeply enough to prevent its splash from being a problem. WLW was good, with 2-3 LEDs lit, though there was an annoying high-pitched noise. Very weak audio from KMOX could be heard. WLAC, too, could be nulled deeply enough to clear up 1500, but WMJL was just barely audible. WSAI was weak, just at the noise level, but without interference. And as with the YB-400, WNAH could be nulled into the noise.

I also tested the radios that supported FM on several FM frequencies. At 20 miles from the nearest FM station, receiver overload is usually not a problem at my location, except on the ICF-2010. The '2010 was fairly sensitive; it could hear a 30-watt FM translator 18 miles away. But, it also suffered badly from overload and poor selectivity. 88.9 WKYU (98,000 watts at 53 miles) was badly clobbered by 88.7 WAYM – less powerful and about the same distance. 92.5 WBKR (91,000 watts at 83 miles) could only be heard if the antenna was positioned just right. Otherwise, overload from 90.3 WPLN and 101.1 WUBT would clobber the channel. No other radio experienced overload on FM. The DX-351 and WM-F12 were not selective enough to separate WBKR from local stations on 92.1 and 92.9, nor sensitive enough to hear any of the flea-powered stations on 88.1.

♦ Mailbag

Trans-Atlantic DXers will soon have a new longwave broadcast target. Patrick Griffith found a press release in which Isle of Man International Broadcasting plc has received a license for a 500 kW station on 279 kHz. The antenna will actually be in the ocean, 9 kilometers off the island! Look for a music format and the name "MusicMann 279." Patrick has also received word of a new 1,200,000-watt station (!) in Sweden on 216 kHz.

Rich, WD3C, commented on the RDS time-setting feature. He turned it off on his Sangean 909 as soon as he bought it, when he realized all the stations in his area were transmitting different (in-

correct) times. After reading this article, he tried it again. In the Philadelphia/Wilmington area, he found six stations transmitting time information. Only two of them were correct!

(Still trying for WDHP-1620!) What radio do you prefer for your AM (or FM) DXing? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!



A few of the radios I tested for this month's column.

Blanket Ban on Pirates Nixed

Robert Thomas sends in a copy of the *New York Daily News* coverage from February 11 of the ruling by the US Court of Appeals in Washington in the case of Greg Ruggiero. This litigation established that the FCC *cannot* automatically deny low power FM licenses to individuals on the sole grounds that they had operated an unlicensed pirate in the past. The court ruled that the FCC still may approve or deny LPMF license applications on a case by case basis.

◆ Pirate Programming CD Available

Some *MT* readers live outside the range where they can get reasonably decent reception of many North American shortwave pirate radio broadcasts. For people like this who remain curious about the content of the programming on stations that we cover each month, Chris Lobdell, the pirate radio editor for the North American Shortwave Association (NASWA), now has two CDs available with some of the best of North American pirates in MP3 format.

One CD features eight shows from K-2000. Although it is not very active anymore, the parodies and comedy on K-2000 are still among the best of the North American pirates from a standpoint of production standards. Another Lobdell MP3 CD features programs 1 through 25 from Radio Azteca. Azteca remains a favorite of many listeners, given its clever and elaborate parodies of DXers and DXing on the pirate radio scene, using music stolen from Rocky and Bullwinkle as bridges between the parody sketches.

At the Winter SWL Festival in Kulpsville, Pennsylvania, Chris announced that these CDs are available for only \$6.00 US via the Stoneham maildrop, which is listed below.

◆ What We Are Hearing

All of these pirates were logged by *MT* readers this month. The stations operate near 6955 kHz or 5 to 10 kHz around that spot, so it pays to tune around while looking for pirate signals. Some stations use AM mode, but upper sideband mode remains the most common broadcasting technique for shortwave pirates.

Blind Faith Radio- Doctor Napalm and classic rock music remain a staple occupant of the shortwave pirate band. (uses blindfaithradio@yahoo.com e-mail)

Bozo Radio- This new one has been heard repeatedly with simple-minded criticism of particular DXers. (None)

KIPM- Alan Maxwell's elaborate psychological dramas stand out on the pirate bands, not only for the weird program content but also for their widely heard signal. (Elkhorn)

Montana Audio Relay Service- Here's one that has been heard before, but which has been reactivated in 2002 after a period of silence. (Merlin)

Mystery Science Radio- Cherokee Jack and his sidekick Tongo have been combining unusual musical selections with a comedy format. (None, asks for loggings in *The ACE*)

Oxycontin Radio- This relatively new one remains somewhat mysterious. It frequently has been heard about the same time as Psycho Radio has been active. Given patterns in logs by *MT* readers, it might also have an association with Bozo Radio. (None)

Psycho Radio- They remain among the most active of the current North American pirate stations with rock music and chanted identifications. (uses psycoradiohd@yahoo.com e-mail, but rarely replies)

Purple Nucleus of Creation- Possibly broadcast in association with Psycho Radio, their music format has consisted of elaborate and mellow new age selections. (Elkhorn)

Radio Azteca- Bram Stoker joins the list of stations memorialized by Chris Lobdell's CD's. (Belfast)

Radio Bingo- The radio bingo game still tends to be rigged, but its signal still gets out on the pirate bands. (Merlin)

Radio Free Euphoria- Captain Ganja normally programs drug advocacy and rock music, but pirate radio advocacy is almost always included. (Belfast)

Seattle Free Radio- As you might expect, this one has been best heard in western North America with sirens, sketches, and drama programming. (uses seattle4166@yahoo.com e-mail)

United Patriot Militia Bingo- The parody of United Patriot Radio still has bingo games to raise money for the fictional patriots, usually with cameo appearances from pirate radio figures. (Merlin)

Voice of Pancho Villa- Pancho always resurfaces for the weekend of the Winter SWL Fest, but sometimes his programs get relayed elsewhere afterward. (Blue Ridge Summit)

Voice of the Tiki- This new one, hosted by Mudda Maxwell, has been programming exotic island music. (Elkhorn)

WAIR- Taking their call letters from an "All Indie Radio" slogan, this new one with Robert J. Yardbrown has been mixing rock music with pirate discussions. (Elkhorn)

WHYP- The James Brownyard memorial station still combines rock music with the weather for Lake Erie cities. (Providence)

◆ How to Find Clandestines

Every month in *MT* we have news of political clandestine stations broadcasting on shortwave to trouble spots around the world, both here in the Outer Limits and in Glenn Hauser's exhaustive information column. We've mentioned it before, but Martin Schoech and Nick Grace have developed the most astonishing clandestine radio resource ever, and it's available to anybody on the internet at the <http://www.clandestineradio.com/> URL.

◆ How to QSL Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash pays postage for a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 69, Elkhorn, NE 68022; and PO Box 293, Merlin, Ontario N0P 1W0, Canada. A few pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* (FRN) go to <http://www.frn.net/> on the web. *Free Radio Weekly* loggings go via niel@ican.net e-mail. Sample copies of *The ACE* are \$2 via the Belfast maildrop. The United States Postal Service has confirmed the spelling of Elkhorn, NE, which has been given a number of variant spellings in the DX press.

◆ Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank all of our contributors: Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Kevin Patterson, Charles City, IA; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Tom Severt, Frontenac, KS; Lee Silvi, Mentor, OH; Bryan Smith, Tyrone, PA; Chris Smolinski, Maryland; Bud Stacey, Setsuma, AL; Ed Walsh; and Niel Wolfish, Toronto, Ontario.

Good DX from Georgia

Herbert Newberry Jr. (Newborn, GA) writes to say that he enjoys reading the *Below 500 kHz* column each month. When he's done reading it, he takes the page from *MT*, 3-ring punches it, and places it in the binder of his *BeaconFinder* directory as a "supplement" to his listening activities.

He reports that the February column on license-free stations was especially interesting to him. Using this information, he managed to hear **JDH** (184.5 kHz) in Bonaire, GA. This station is roughly 84 miles south-southwest of his location, and is a very good catch for a 1-watt transmitting station. I am following up with Herbert to obtain a QSLing address for the station.

Herbert also supplied an impressive assortment of loggings (see Table 1) from his location, 45 miles East-Southeast of Atlanta. For equipment, he uses a Kenwood R-5000 general coverage receiver and an antenna system consisting of two random wires, one due West and another due north. A magnetic balun is used to match the wires to the coaxial lead-ins of 50 feet each. Judging from the variety of his loggings, I'd say this arrangement is working very well. He notes that he is expanding the antenna system to an even larger size, but will soon approach physical

limitations (property lines and power lines).

Finally, Herbert notes that for NAVTEX reception on 518 kHz, he uses the FSK setting on his receiver and feeds the audio through a Microdec MD 300 decoder from Somerset Electronics. He reports good success using the decoder to display NAVTEX and SITOR transmissions. In addition to longwave work, Herbert also enjoys DXing the AM broadcast band.

◆ New LW Broadcaster

In the last issue, we noted that longtime LW broadcaster Atlantic 252 (Ireland) had changed to an all-sports format. I was lamenting this change, because I enjoyed hearing something other than talk from LW broadcast stations. Talk seems to be the predominant mode for these stations, and Atlantic 252 was a welcome exception.

Well, no sooner did I send in last month's column, than *MT* Editor Rachel Baughn forwarded an interesting news release from the Isle of Man Communications Commission. The release reports that a new station has been authorized to operate from the Island after a long and challenging application process. Provisionally called *MusicMann 279* (279 kHz) the station will be music-led and will target an audience across Britain and Ireland. It is expected to begin operation in late 2003.

Interestingly, the transmitting antenna will be located on an off-shore platform near the spot that formerly occupied by shipboard station *Radio Caroline* many years ago. About 50 new jobs are expected to be created in the town where the *MusicMann* studios will be located. According to the Chairman of the Communications Commission, the Hon. Phil Braidwood, "The Isle of Man first

sought a high power broadcasting frequency four decades ago. IMIB now has the opportunity to demonstrate that the Island is again a vibrant source of entertaining radio for the whole of the British Isles."

That wraps it up for May. Good DX, and I'll see you again next month.

Table 1. LW Loggings from Georgia

Freq.ID	Location	376 ZIN	Great Inagua Is-
198 DIW	Dixon, NC	378 TGC	Trenton, TN
206 GLS	Galveston, TX	380 UMB	Milledgeville, GA
219 HOE	Homerville, GA	380 UCY	Cayojoabo, Cuba
212 OKZ	Sandersville, GA	382 YPL	Pickle Lake, ON
216 CLB	Wilmington, NC	385 EMR	Augusta, GA
221 BJT	Athens, GA	388 AM	Tampa, FL
224 BH	Birmingham, AL	391 DDP	San Juan, PR
230 CPP	Cullman, AL	392 JNM	Monroe, GA
234 EGQ	Newman, GA	392 ML	Charlevoix, QC
236 GNI	Grans Isle, LA	392 VEP	Vero Beach, FL
239 GIV	Greenwood, SC	394 YB	North Bay, ON
242 LKG	Americus, GA	398 TGQ	Elizabethtown, NC
244 DDA	Jefferson, GA	400 OHY	Cordele, GA
245 GTP	Thomasville, GA	400 XW	Flemingsburg, KY
245 JYL	Sylvania, GA	401 GKG	Mayfield, KY
245 YZE	Gore Bay, ON	404 CKI	Kingstree, SC
248 FRT	Spartanburg, SC	405 UTX	Jupiter, FL
248 QL	Lethbridge, AB	407 H	Montreal, QC
257 CEU	Clemson, SC	410 XBR	Ft. Rucker, LA
257 SQT	Melbourne, FL	412 JHH	Griffin, GA
260 MTH	Marathon, FL	413 MC	McComb, MS
266 BR	Atlanta, GA	414 BC	Baie Comeau, QC
280 MQW	McRae, GA	415 CBC	Cayman Brac, Cay-
309 EEX	Swainsboro, GA		man Isl.
316 FF	Atlanta, GA	415 DJD	Canton, GA
323 OUK	Calhoun, GA	417 HHG	Huntington, IN
326 PKZ	Pensacola, FL	417 HQT	Coats, NC
329 CH	Charleston, SC	419 TX	Lawrenceville, GA
329 YHN	Hornepayne, ON	420 CFY	Lake City, SC
330 CZM	Cozumel, MX	420 TU	Tupelo, MS
332 FIS	Key West, FL	421 CF	McKinney, TX
333 HQV	Thomson, GA	423 AU	Auburn, AL
335 LEE	Leesburg, FL	423 OC	Ocala, FL
335 MK	Marion, GA	426 FTP	Ft. Payne, AL
339 OP	Thomaston, GA	426 IZS	Montezuma, GA
341 CQN	Chattanooga, TN	429 KY	Springfield, KY
344 JA	Jacksonville, FL	430 AYB	Auburn, AL
344 ZIY	Georgetown, Gr. Cayman	432 IZN	Lincolnton, NC
347 AJR	Cornelia, GA	432 MHP	Metter, GA
349 GW	Greenwood, MS	435 IYI	Washington, GA
350 CE	Raleigh/Durham, NC	450 PPA	Puerto Plata, Dom.
350 BVG	Enterprise, AL		Rep.
351 YKQ	Ft. Rupert, QC	512 HMY	Lexington, OK
353 VV	Greensboro, GA	515 PKV	Port Lavaca, TX
353 OG	Windsor, ON	518 —	Various NAVTEX
358 TNY	Fayetteville, TN	518 GCT	Guthrie Center, IA
362 SB	Sudbury, ON	521 GM	Greenville, SC
365 FKV	Gainesville, TX	521 TVX	Greencastle, IN
365 FT	Fort Worth, TX	526 ZLS	Stella Maris, BAH
366 YMW	Maniwaki, QC		
370 VOF	Covington, GA		

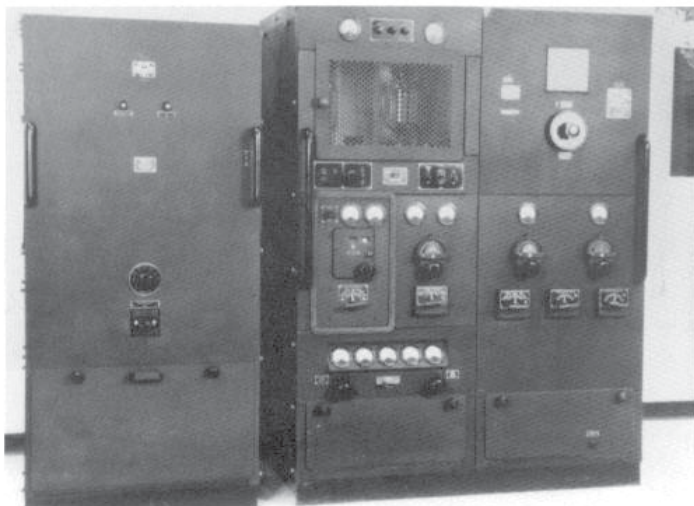


Figure 1. Interested in seeing a mammoth LW transmitter like this shipboard unit? You can see it, along with hundreds of other wire-less artifacts at the Hammond Museum of Radio in Guelph, Ontario. Check them out on the web at <http://www.kwarc.org/hammond/museum.html>.

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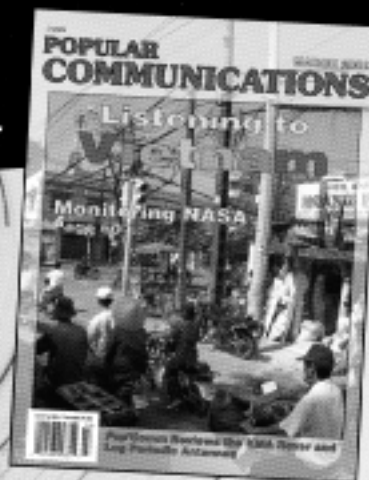
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Building Your Parts Stash

Over the last few months I've been "taking my show on the road." I've had the opportunity to speak at several amateur radio club meetings and the Kulpville SWL Winterfest. The subject I was asked to speak on is the revival of kit building and "home brewing" of basic ham gear. For some of us, such as your humble author, home building never stopped. However, it seems that a whole new generation of hams has discovered the pleasures of putting together their own transmitters, receivers and accessories. There is nothing quite as rewarding as a QSO using something you made yourself.

Well, at all of these meetings, one particular question kept coming up again and again: "Where can I find the parts I need to build my own radio gear?" There may be a Radio Shack on every corner but even the best-stocked Radio Shack only carries a small number of common electronic components. A quick look at almost any schematic will show that a budding home builder will need to develop a number of additional resources if they want to get the job done.

Let's begin by looking at a few of the less obvious possibilities, largely because they can represent a good deal of cost savings.

◆ The evolving junk box

Whenever I start building, I first turn to my well stocked junk box. Well, actually, it has grown into more of a *junk room* at this point. Over 25 years of home building bliss has resulted in tons of parts that can be brought into service to build all manner of things.

You may have only recently come into ham radio and its home brewing activities, so your personal collection of electronic goodies may be rather sparse. You can develop your junk box by scrounging parts deals at hamfests and computer shows. You can strip useful parts out of old consumer electronics. You can often borrow a cup-o-parts from other local hams' junk boxes. Remember, anything you can pull out of your (or your friend's) junk box is one less thing you have to buy.

Don't forget that a little bit of electronics theory can go a long way in saving a few dollars. Let's say you don't have the 100 ohm resistor the circuit calls for. A couple of 51 ohm resistors wired in series (and allowing for tolerance) will get you there fine. Likewise, a pair of 200 ohm resistors wired in parallel.

It's a bit more tricky with capacitors, but in a purely DC circuit a couple of 5.6 uf capaci-

tors hooked up in parallel will yield close enough to that 12 uf unit you need to get the circuit working in most cases. A look at a cross reference list or semiconductor data book will show that the characteristics of many common transistors and diodes make them swappable in common use. Parts substitution is the order of the day in ham radio home building.

But now we come down to the court of last resort. You couldn't find the part you need either in the blister packs hanging on the walls at Radio Shack or by digging into the depths of you or your compatriot's junk box. Where else is there to turn?

◆ Resources for new parts

Well, technically there are dozens of parts resources. But a quick search on the Internet will reveal that most suppliers of electronic components are set up to do business with ... you guessed it ... businesses. Finding those outfits that are willing to do deals in small, hobby-sized lots requires a bit more work. But fear not, Uncle Skip has been at this game for a whole lot of years. Let me steer you to those resources I use for such situations. The really good news is that these folks can all be found on the Internet.

Dan's Small Parts and Kits Box 3634

Missoula, Montana 59806-3634

Phone: (406) 258 2782

<http://www.fix.net/~jparker/dans.html>

Dan's Small Parts is usually my first stop for parts. Dan keeps abreast of the circuits that are regularly published in the amateur radio press and works hard to keep the right stuff in stock. He also keeps an eye on parts that are harder to find and stocks them at very reasonable prices. He has the widest selection of air-variable capacitors I have found anywhere. Dan's on-line catalog is fun to browse. It is updated at least monthly and he usually has a number of specials going. His policy is no minimum sized order. Every order is subject to the same \$5.00 shipping and handling fee.

Far Circuits
18N640 Field Court
Dundee, Illinois 60118
(847) 836-9148 Voice/Fax
<http://www.farcircuits.net/>

Okay, shame on me for including this re-

source, because they do not sell parts as such. However, as I mentioned earlier on, many people like to build up the circuits they find in the popular ham radio and electronics magazines. Far Circuits specializes in manufacturing the printed circuit boards that support these various projects. Their boards are all made of high quality G-10 material and come drilled and solder-coated so they are a joy to work with. There have been times that I have decided to build a project solely on the fact that Far Circuits has made a board available for it.

By the way, they do stock a small number of excellent kits that are great for folks just starting out in home building. No minimum on the order size. There is a \$1.50 shipping and handling charge for each quantity of four boards ordered.

Mouser Electronics
1000 North Main Street
Mansfield, Tx 76063-1511
Phone: (800) 346-6873
Fax: (817) 804-3899
<http://www.mouser.com/index.cfm>

If Dan's doesn't have it handy, my next stop is usually Mouser Electronics. Mouser has no minimum order so they are great to deal with in the small quantities that ham home brewers like to purchase. However, if you are in a position to buy in quantity, they usually quote a better price in quantities of 50, 100 or 500 pieces. It's easy enough to pull together a "group buy" if a number of folks in your local club decide to build the same project.

Mouser's semiconductor line is vast. They offer online ordering and shipment tracking. If you are old fashioned, they still offer a fine printed catalog that is great for poring over in the wee hours, looking for neat new ideas.

Digi-Key Corporation
701 Brooks Avenue South
Thief River Falls, MN 56701
Phone: (800) 344-4539 or (218) 681-6674
Fax: (218) 681-3380
<http://www.digikey.com/>



Digi-Key is in the same class as Mouser in terms of the breadth of components offered. Like most large parts houses they are moving strongly into surface mount components. They

still maintain a good "through the hole" inventory. They carry a wide variety of "Toko" brand inductors. These are fairly common in modern RF design. They offer quantity discounts on lots of 10 and 25 pieces in most cases. While they have no minimum order, they do place a \$5.00 service charge on orders under \$25.00.

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
Phone: (800) 831-4242
Fax: (800) 237-6948
<http://www.jameco.com/>



Raise your hand if you remember when Jameco was known as James Inc.! Back in the mid seventies this company was at the forefront of the personal computer movement. That was back in the day when you actually tried to build your own unit out of a double handful of chips and a schematic from Dan Lancaster.

Through the years they have remained a great source of parts, including many hard to find and out of production items. Their Web site includes a technical support section that includes such features as an IC database. They have always been friendly folks when I've placed a call. They have no minimum order but charge a \$5.00 handling fee on orders under \$20.00. This fee is waived if you order on-line.

JDR Microdevices
1850 South 10th Street
San Jose, CA 95112-4108
Phone: 1-800-538-5000
Fax: 1-800-538-5005
<http://www.jdr.com>

Thinking about Jameco's early years in the personal computer realm reminds me to deviate a bit from the parts palaver to mention JDR Microdevices. Keeping a good ham shack up and running these days is fairly hard to do without a computer. JDR is one of those rare outfits that still believes in the "hobby" aspects of computing. They stock all kinds of things to support your existing PC or even allow you to build a unit from the case on up. Their catalogs and web site contain many useful hints written by noted Techno-Guru Derick Moore. JDR offers excellent technical support before and after the sale. By the way, they do, in fact, sell electronic components as well as computer goodies.

NTE
44 Farrand St.
Bloomfield, NJ 07003
Phone: (973) 748-5089
Fax: (974) 748- 6224
<http://www.ntinc.com/>

NTE is another high quality parts house. In addition to providing fine on-line and print catalogs, they offer "Quick-Cross" a free, downloadable cross reference software package

that really helps in choosing the right component for the job. NTE does not ship direct but operates through a number of distributors listed off of their website, including Mouser listed above. Their website also provides a semiconductor data sheet database that is very useful to the home building hobbyist.

B.G. Micro
555 N. 5th. St. Suite #125
Garland, TX 75040
Phone: (800) 276-2206
Fax: (972) 205-9417
<http://www.bgmicro.com/>

No ham radio parts supplier list would be complete without a good Surplus House. B.G. Micro is one of the best. My significant other dreads when the catalog shows up in the mailbox. I usually find a couple of neat items I didn't even know I needed. They have

no minimum order. Their website contains their latest print catalog in Adobe pdf format, so you don't even need to wait for the mailperson to show up at your door. They also have on-line a number of data sheets for their more common products.

CWS Bytemark
1510 E Edinger Ave #B
Santa Ana, CA 92705
Phone 714-547-3276
Fax 714-547-4433
<http://www.bytemark.com>

Home building ham radio gear is next to impossible without a source for inductors and inductor materials. CWS Bytemark is a one-stop shopping mall for iron powdered and ferrite cores as well as chokes, molded inductors and baluns. Further, their site is essentially a technical manual on inductance for RF applications. In addition to components, they sell a number of "Experimenters Kits" and "Balun Kits." They have no minimum order but do charge \$2.00 handling on orders under \$20.00. They offer price discounts for quantity orders or individual items.

There are many more parts sources available and most are also accessible by way of the Internet. The outfits listed above are ones I have had good history with. Now you have no excuse not to dig out that schematic you've had in your desk drawer. I'll be listening for you sending "Rig is home brew" real soon! Have fun. I'll see you on the lower end of 40 meters.

UNCLE SKIP'S CONTEST CALENDAR

May 4-5

Indiana QSO Party
5/4, 1300 - 5/5, 0500
UTC

New England QSO Party
5/4, 2000 - 5/5, 0300
UTC
5/5, 1100 - 5/5, 2400
UTC

May 11-12

Nevada QSO Party
5/11, 0000 - 5/12, 0600
UTC

Oregon QSO Party
5/11, 1400 - 5/12, 0200
UTC

FISTS Spring Sprint
5/11, 1700 - 5/11, 2100
UTC

May 25-26

CQ WW WPX Contest
(CW) 5/25, 0000 -
5/26, 2400 UTC

May 26

QRP ARCI Hoot Owl
Sprint 5/26, 2000 -
2400 Local Time

May 27-28

MI QRP Memorial Day
CW Sprint 5/27, 2300 -
5/28, 0300 UTC

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Getting to Work on the R-23A

In the March column, we completed alignment and testing of the Army version (SCR274N series) of the BC-453 (190-550 kHz) command set. Last month, we took a rest on the command set project for a bit in order to acquaint you with sources of parts, periodicals and information that will be helpful to you as you become more involved in the acquisition and restoration of vintage radios. This month, I'd like to continue the command set story by discussing the work done so far on the Navy version of the equivalent radio (in the ARC-5 series), known as the R-23A.

❖ Caution: Owner Mods!

When I originally decided to rehab both a BC-453 and an R-23A in this column, my motivation was to uncover differences in circuitry of interest to the restorer. These models are both fairly common at radio meets, and I figured that an interested reader would be as likely to come across one as the other. Actually, though there *are* differences in circuitry, the most interesting lesson to come out of this R-23A project is the need to be alert for owner modifications that might be half-baked or undesirable.

I've covered the differences in circuitry in an earlier column, but I'll review the major ones now. In brief, the R-23A has automatic volume control, while the BC-453 does not. For that reason, the former substitutes a 12SF7 second i.f. amplifier for the 12SK7 used by the latter (the 12SF7 has a set of diode plates used as a AVC rectifier). In addition, the R-23A has an antenna circuit that is switchable to accept either unbalanced (long wire) or balanced

(loop) inputs, while the 453 has only unbalanced input. Finally, the R-23A does not have headphone output available at the front local-control connector, as does the 453. Instead, there is an audio connection point for a navigational positioning indicator.

Because these radios were so plentiful, inexpensive, and reasonably close to state of the art when they first appeared on the surplus market at the close of World War II, the command sets were extremely popular with hams and shortwave listeners. Some were satisfied to leave the circuitry intact, simply returning the sets to operating condition. Others were experimentally minded and modified the radios in accordance with their own ideas.

If one could purchase a command set for five dollars new and easily replace it if something went wrong, there was little need for caution or conservatism. As a result, these little radios were among the most heavily modified of the military sets that came into civilian hands. Go through any command set you acquire with a fine tooth comb! Chances are, any changes you find will make sense and can be reversed if desired. Otherwise, store the radio as a parts source for future sets you may find.

It was obvious from the start that the BC-453 I've already restored had seen very little modification or use. The previous owner hadn't even bothered to install a complete local control panel – substituting a wire pigtail for the CW oscillator switch. He seemed to have tried it out and put it aside after satisfying his curiosity. But this R-23A was a different story. Its owner had meddled a great deal more in his receiver's circuitry. And, while he did not butcher his unit and the work

seemed reasonably knowledgeable, I wasn't impressed enough to keep it.

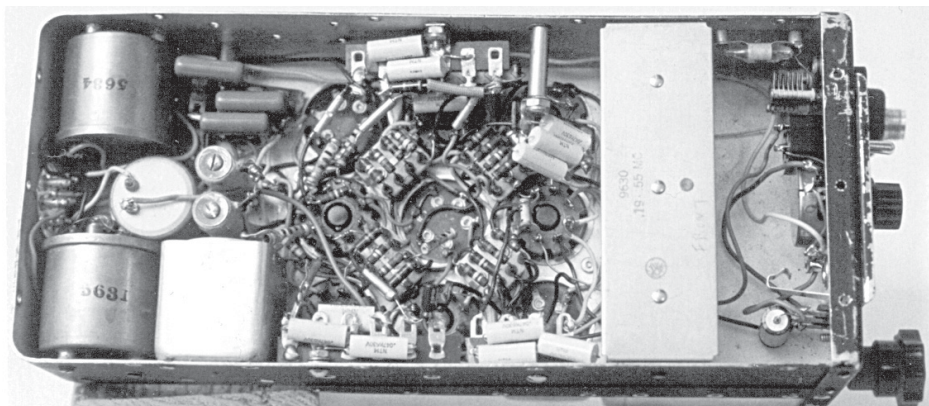
❖ Reversing the Mods

The major change was some questionable wiring that had been added to make the BFO adjustable from the front panel. A small variable capacitor was wired into the BFO circuitry via a d.p.d.t. switch having a center off position. With this, the BFO could be either disabled or activated with or without the added variable cap. The switch and variable cap were mounted on the control panel along with a volume control potentiometer, which turned out to be 40k instead of the recommended 50k. A 10k resistor was placed in series with the pot to normalize the value.

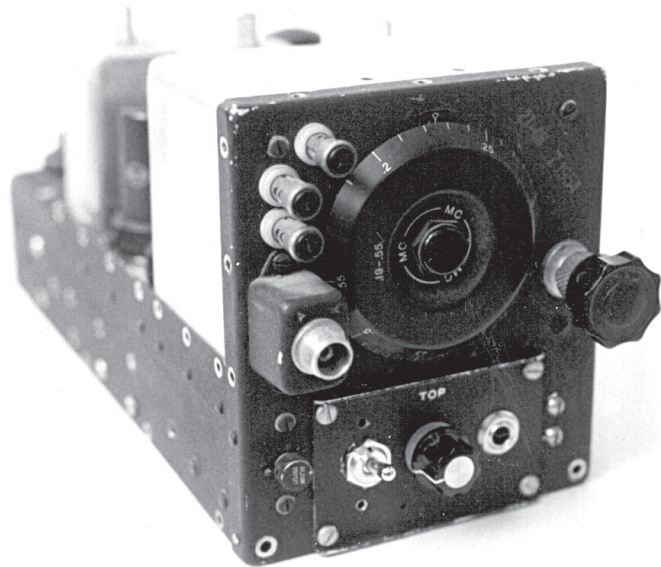
These three controls took up so much room that the attachment plug behind the front panel adapter plate, left intact by most users, had to be removed – along with its aluminum well – to provide clearance. All of the wires going to the plug had been removed and thus could no longer be identified by their pin positions. The ones needed by the owner had been connected directly to the new controls mounted on the adapter plate. The others were either cut back to their points of origination or simply left hanging.

I saw no need for an adjustable BFO and decided to reverse all of the previous modifications; this was definitely a challenge not to be attempted without the help of a good schematic! As I was rewiring the connections, I discovered that the previous owner had also eliminated wiring that made it possible to feed the tube heaters from the connector at the chassis rear apron. Originally this wiring had been routed through two pins on the front adapter plug, allowing for the possibility of connecting an "on-off" switch.

Operating voltages can also be connected via the three-pin plug on the dynamotor deck, but I wanted to be able to power the set through that rear connector. So, I routed a new lead from the proper pin directly to the heater voltage bus. I also ran a lead from the headset output pin on the connector (as mentioned, this was not included in the original wiring), through the set, up to the front panel position so that I could connect a headset jack there. Stripping the previous owner's controls from the front panel, I replaced them with a simple s.p.s.t. BFO switch, a phone jack, and a 50k volume control potentiometer.



Underside of recapped R-23A. Note wiring behind simplified local control panel (at right).



Front view of R-23A showing new local control panel. Knob at right is for tuning. Shaft at left accepts a second knob for antenna switching (see text). Top binding post is for wire antenna; the two below it are for a loop.

Having reversed all of the mods – at least those I was able to find – I turned my attention to recapping the radio. This process is virtually identical to that already described for the BC-453 in the February 2002 issue of this column, and there is no need to review it in detail here. Suffice it to say that it involved removing all of the cylindrical can capacitors and replacing them with modern units mounted on terminal strips. Wiring and lead dress were maintained as similar as possible to the original installation.

With the radio recapped, the next step will be to apply power and try it out. Because all of the wiring changes made by the original owner and by me, there is a lot of opportunity for error. So it's quite possible that the smoke test will not go smoothly! But maybe I'll get lucky. I'll let you know next time.

I really hadn't intended to keep this command set series of articles going so long, but now I'm really glad I went through the exercise of rehabbing the second radio. A lot of new information came out of it! We'll wrap up next month.

◆ From the Readers

This project seems to have stimulated a lot of interest among our readers, and I'd like to review some of the interesting and useful e-mailed comments I've received.

Clarence Owens, N2RJB, reports that bench test manuals and other very useful command set information can be found at <http://www.fernblatt.net/>. And anyone interested in deciphering the manufacturer's codes used as prefixes to the type designations for the Navy's ARA series of command sets (see my December 2001 column) will find the key on Fred Chesson's web site, <http://pages.athome.net/fwc/NAV-MFG.HTM>. Fred has much additional info on old military sets on his site. Clarence also suggests review-

ing the manual section of Bill Beech's site, <http://www.nj7p.org/> and checking the schematics listed at http://www.one-electron.com/FC_Military.html.

Dean Billing, WA6IKJ, passes along the following information on command set evolution, which I quote with minor edits:

"The Navy ATA/ARA radio set was the first version of what is commonly referred to as the 'ARC-5 Command Set.' The contract stemmed from work done in the 1930s by a small company in Boonton, NJ, known as Aircraft Radio Corporation. (Please note that 'ARC' in ARC-5 does not denote Aircraft Radio Corporation, but rather 'airborne radio communications'.)"

"With war imminent, The Army Air Corps. was directed to buy command sets based on the Navy ATA/ARA design contract when their new radio set known as the SCR-240, a crystal controlled design, failed to meet specifications. The Army sets were designated 'SCR-274-N,' with the N standing for Navy!"

"After the war began, the Navy issued an updated specification for an improved ATA/ARA set that became the AN/ARC-5 under the new joint nomenclature adopted during the war. To track down articles on the history of the ATA/ARA, SCR-274-N, and AN/ARC-5 development, check out my web site at <http://www.scr-274-n.info>. The Links page has links to other sites that differentiate the models and provide documentation.

"If you are looking at a command set that is in natural aluminum finish and has a BC-NNN ID, it is a Basic Component of the SCR-274-N set and was made for the Army Air Corps, probably by Western Electric under subcontract. If your set has a black wrinkle finish, it will be with either a component of the early ARA set and designated CXX-461NN, or a component of the AN/ARC-5 set and designated R-2N."

Those of you who can't stand the idea of removing all those cute little original capacitors from your command set receivers will be interested in another note I received from **Clarence Owens**, who has heard that these sets can be operated on plate voltages as low as 35-40. He is going to try out the idea on one of his 13 units, a broadcast band ARC-5.

Tom Bridges, KE4RHH, reminds us that many of the early command set conversions were done using transformerless (ac-dc) power supplies. Such supplies have one leg

of the a.c. line connected to ground and are potentially very deadly. If your flea-market purchase came with such a power supply, remove it immediately!

Tom also passes along an idea for a high-pass audio filter to improve command set selectivity, which was made intentionally wide in the original design. He uses a Radio Shack output transformer with a primary of 1000 ohms and a secondary of 8 ohms along with two RS non-polarized 1 mFd, 50-volt electrolytic caps. The primary is connected to the command set's headphone output in series with one of the caps. The other cap is connected across the primary. His 8-ohm phones are connected across the secondary. Tom realizes that there is a mismatch between the command set output and the transformer primary, but the hookup works like a champ!

Thanks much to **Craig Leventhal**, who passed along a chart of command set nomenclature for the old *CQ Magazine* "Command Sets" publication (CQ Tech Series #106).

Finally, departing from our command set thread for a moment, thanks also to **Bill Siedsma**, KB7UTU, for passing along an interesting article about radio museum operator Henry Rodgers from the web site (http://www.lvrj.com/lvrj_home/2002/Jan-28-Mon-2002/news/17929190.html) of a Las Vegas, NV newspaper. Rodgers' own web site can be found at <http://www.radioblvd.com/nevradiohist.htm>.

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What is NVIS, and What is it Good For?

What Is NVIS?

As you probably know, when radio waves leave an antenna and travel skyward, they are often reflected or refracted from the ionosphere, and then return to earth. On the other hand, the higher the wave's frequency the more likely the wave is to punch right through the layers of the ionosphere and travel on into outer space. It's also true that the closer to straight up the wave travels, the more likely it is to punch through and leave the earth behind forever.

Waves traveling straight up are said to strike the ionosphere at "vertical incidence." But, if their frequency is low enough (below the MUF*), and their angle of incidence is vertical, or close to vertical, then there can be abundant reflection or refraction of the waves back to earth. When this happens the waves are known as "near-vertical incidence skywaves," or "NVIS."

The pattern of the waves returning to earth from the ionosphere is something like what happens to water when you squirt a hose straight up at a ceiling: the water comes down all around you. In NVIS propagation the returning waves come back down from the ionosphere in the area around the transmitting antenna covering a radius of up to 600 miles. Frequently, good communication can be had within all this area using low transmitter-power levels; often 20 watts is sufficient.

Obviously then, one application of NVIS is for communications with the area surrounding the transmitting antenna. Of course, in relatively level areas, direct waves and ground waves also cover an area surrounding the transmitting antenna. However, these areas are significantly smaller than NVIS areas at customary NVIS power levels, antenna heights, and frequencies.

Even more important, what if the transmitting antenna is in a valley surrounded by mountains, or in a large city surrounded by many tall buildings? Environments like these can block the direct path for communication to the surrounding area. In such cases NVIS can often provide support for the desired communication, because NVIS signals propagate up and then down, rather than directly between antennas.

Conditions Favorable to NVIS

NVIS communications is most successful from about 2 MHz to 12 MHz. In addition to the near-vertical orientation of the waves, the degree of ionization of the ionosphere is important in whether NVIS waves are returned to earth or not: daytime and periods of high sunspot activity are best. Also of major importance is the radiation and reception pattern (R&R pattern) of the transmitting and receiving antennas. Obviously, it is desirable to have an R&R pattern which emphasizes near-vertical launching of waves and responsiveness to near-vertical received waves.

NVIS Antennas

A wire on, or close to, the ground will function as an NVIS antenna, although not nearly as efficiently as those higher above ground. For instance, a horizontal dipole antenna mounted a tenth to a quarter wavelength above the ground is more effective for NVIS than an on-the-ground antenna. In this case, the dipole is one element of a simple beam antenna, and the earth acts as a reflector helping direct radiation and reception upward.

Even more-effective beams can be made utilizing a horizontal wire antenna mounted about a tenth to a quarter wavelength above a reflector wire-element. The reflector can be near the earth (fig. 1), but the higher the better. For transmitting with the antennas of fig. 1, some kind of matching should be used: a transmatch between the feedline and transmitter, or a matching device between the feedline and antenna.

An interesting fact is that, for most of us, it is difficult to get our horizontal antennas up the half wavelength above ground desired for DX work. This is especially true on the MF band and the lower portion of the HF band. Therefore, many of our horizontal antennas are NVIS antennas even if we really wanted them to be DX antennas!

For operating mobile in NVIS mode it's possible to simply adjust or tie the flexible whip antenna on a vehicle so that it is horizontal, and along the side of the vehicle's body. A more unwieldy position, but one in which the antenna will perform better, is with the whip tied horizontally out over the ground away from the vehicle. These horizontal positions maximize the antenna's vertical R&R patterning.

Let's Build One

Former MT writer Doug DeMaw, W1FB (SK), in his *W1FB's Antenna Notebook*, discusses what he calls "cloud-warmer" antennas. As you can guess from that name, these are NVIS antennas. Two variations of this type of antenna are shown in fig. 1.

It is true that, even with .15 wavelength spacing between elements as shown, these antennas will receive some DX signals. But their main response will be to closer-in signals. However, if you increase the spacing to .5 wavelength, then their R&R patterns will favor DX signals. And so, if you provide a means of adjusting the spacing, you can choose the kind of signals the antenna favors:

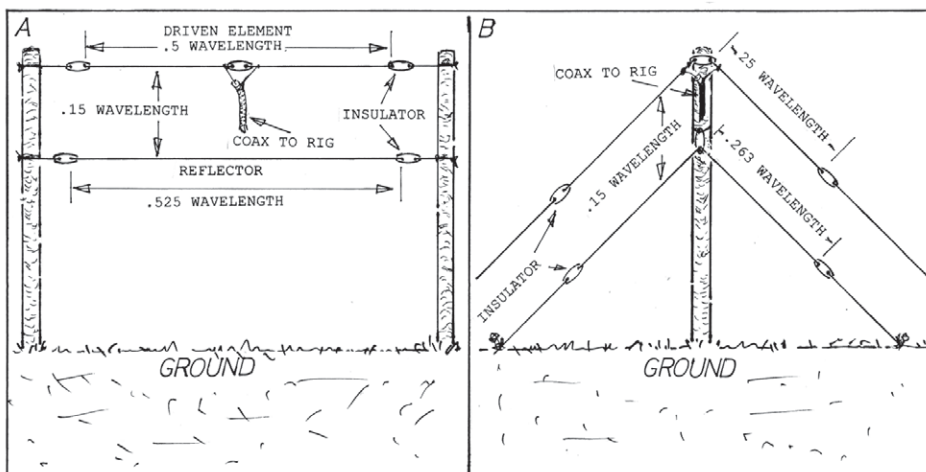


Fig. 1. A horizontal-element Yagi antenna oriented for NVIS(A), and an inverted-V, Yagi-type, beam antenna also oriented for NVIS (B).

This Month's Interesting Antenna-Related Web site:

This first site discusses the NVIS book mentioned above:

<http://www.antennex.com/shack/Jan02/nvis.html>

The second site covers making an NVIS antenna. <http://www.n6mrx.com/Antenna/Near%20Vertical%20Incident%20Scattering%20Antenna.htm#Top>

close-in or DX.

If you make this antenna an adjustable "NVIS-DX" antenna, probably the inverted-V would be easier to adjust, as it needs only one high mast. You could put the driven-element center-insulator on a rope and pulley and then re-orient the tie ropes at the driven-element end insulators when the height of the driven element is changed via the pulley.

The size of one wavelength in wire can be found by: Length (feet) = 936/Frequency (MHz), or Length (meters) = 284/Frequency (MHz). So, an element 1 wavelength long at 10 MHz would be 93.6 feet, or 28.4 meters long. The driven elements of the beams should be .5 wavelength by these formulas,

and the reflectors should be .525 wavelength.

Spacing between elements is in air so use: $147.6/\text{Frequency (MHz)} = \text{Spacing in feet}$. Spacing for a 10 MHz beam would be $147.6/10 = 14.76$ feet. For spacing in meters $\text{Length} = 45/\text{frequency in MHz}$. Spacing at 10 MHz would be 4.5 meters.

◆ Want More on NVIS?

A great little book about NVIS communications is *Near Vertical Incidence Skywave Communication* (\$14.00, Worldradio Books, P.O. Box 189490, Sacramento, CA 95818, 1-800-366-9192) <http://www.wr6wr.com/Products/Books/NVIS/nvis.html> This 144 page book covers the basic theory as well as the practical application of NVIS. A variety of antenna types, including mobile, are covered. See web sites above for a detailed review.

* In simple terms "MUF," or "maximum usable frequency," is the highest frequency at which signals will refract back from the ionosphere rather than punch through it. MUF varies with factors such as time of day, season, and sunspot cycle.

RADIO RIDDLES

Last Month:

I substituted a joke for the riddle. It was about two antennas having a mediocre wedding, but a great reception (laugh here). With that in mind, have you ever heard of two antennas kissing? Well, in the good old days of radio when the large wire beams were being developed, the invention of the rhombic beam was sometimes described as connecting two V beams mouth-to-mouth!

This Month:

OK, so near-vertical radio waves can be returned to earth under the proper conditions, and they can support communications. What about near-horizontal waves that travel out to the horizon, and then head on out toward the ionosphere and outer space? Do they punch through the ionosphere to be forever lost in space, or what?

You'll find an answer for this month's riddle, another interesting, antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Radio Okapi Hits The Shortwaves

By Hans Johnson

Appearing to be half giraffe and half zebra, the okapi was unknown to the West until 1900. This elusive mammal inhabits the thick rainforests of the Congo. Shy as it might be in the forest or zoo, the okapi is becoming better known as the namesake of a new radio station.

Radio Okapi, coming from Kinshasa, the capital of the Congo, is now broadcasting 24 hours a day on the frequency of 9550 kilohertz.

Even though the station is transmitting with a used transmitter of just 10 kilowatts from the heart of Africa, Okapi has been heard around the globe. The best reception for distant listeners is at around 2000 hours universal time in Europe and at 0000 hours in the Western Hemisphere. Programming is mostly in French and African music is widely featured.

The shortwave station is just one piece in a transmitting network that will include FM, satellite, and the Internet. There are plans to add three additional shortwave transmitters.

Radio Okapi hopes to promote peace in the Congo after several years of war. It is a joint project between the Hironde Foundation <http://www.hirondelle.org> of Switzerland and

the United Nations Observer Mission in the Congo (MONUC) http://www.un.org/Depts/dpko/monuc/monuc_body.htm

Hironde's is a non-governmental organization whose primary objective is to use radio to promote peace and reconciliation in troubled regions. It has worked in such areas in Africa, Europe, and Asia.

The organization is not a newcomer when it comes to running a shortwave station in Africa. Hironde has had stations in Liberia and the Central African Republic. Indeed, it even had a station in the Congo (then Zaire) in the mid-1990s.

The idea is that the broadcasting infrastructure of Radio Okapi will remain long after Hironde and MONUC have left the Congo. Such a station is needed. The national broadcaster has to rely on shortwave relays via Afrique Numero Un in Gabon. Other regional shortwave stations have long been in rebel hands.

Hironde will need a stable environment to pull this off. Previous efforts in both Zaire and Liberia to establish a peaceful media voice ended due to political instability in Zaire and government opposition in Liberia. When a peaceful climate remains in place, Hironde succeeds as they did with Radio Ndeke Luka in the Central African Republic.

The Hironde Foundation explains that the Radio Okapi is really not equipped to handle reception reports from listeners. After all, their mission is quite different. However, Dominique Jaccard of

Hironde explains that they do plan to issue QSL cards from the headquarters in Switzerland. Ms. Jaccard requests that all reports go to Fondation Hironde, 3 Rue Traversière, Lausanne 1018, Switzerland. Listeners wanting a response by email can send them to info@hirondelle.org

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Radio Shack PRO-2053 Trunk-Tracking Scanner

The Radio Shack PRO-2053 is a 300 channel, trunk tracking, desk top scanner made in China by GRE (General Research Electronics). It is a cost and feature reduced cousin of the 500 channel PRO-2067 mobile scanner we reviewed in September 2000 *MT*.

Radio Shack sent us an early PRO-2053, fitted with version 1.00 firmware and bearing date code 07A01. We inspected the firmware version by pressing the 3 key while the welcome message is visible, shortly after power up.

◆ Frequency Coverage

It receives AM and FM signals on the most popular scanner bands plus Citizens Band, 216 - 220, and 1240 - 1300 MHz. Neither the PRO-2053 nor its upscale PRO-2067 cousin tune the UHF military air band, the 72 MHz mid band, nor most television frequencies.

The PRO-2053 tunes the 137 - 174 MHz band using factory-selected steps of 5, 6.25, or 7.5 kHz, and the user cannot change the step size. As a consequence, you cannot directly program frequencies like 160.000 MHz because the radio coerces the entry to the closest FCC allocated channel of 159.9975 MHz. The VHF-high federal assignments, e.g., 165.2375 MHz, are coerced as well.

◆ Memory and Modes

The PRO-2053's 300 memory channels are divided equally among 10 banks. Each channel has a mode: AM, FM, MO (Motorola trunked), or ED (EDACS trunked). The PRO-2067 supports LTR trunking, CTCSS and DCS squelch, but the PRO-2053 does not. Both models provide the flexibility of choosing between AM or FM, which is handy when scanning military activity adjacent to the 2 meter ham band because the military employs both modes within the same band.

For trunking purposes, a memory bank must be designated as MO or ED. You can mix conventional and a trunked system within the same bank, but you cannot use a bank for both Motorola and EDACS trunking.

The PRO-2053 has a total of 10 talk group ID banks and each one contains five sub-banks. Each sub-bank can hold 20 IDs.

You can program a 12-character label for

each memory bank and each memory channel. Both the channel label and frequency are displayed simultaneously when stopped on a channel. A defect in our PRO-2053's version 1.00 firmware causes some of the labels for channels in banks 0 and 1 to be overwritten by the labels from banks 8 and 9. For instance, channels 004 and 820 share the same label.



Figure 1: Radio Shack PRO-2053 Trunk Tracking scanner

◆ Scanning and Searching

Each memory channel supports a selectable 2-second rescan delay and the delay works well for talk groups when scanning trunked systems. The PRO-2053 scans combinations of conventional and trunked systems with little, if any, noticeable delay while switching between the two. Trunked systems may be scanned in open or closed mode. I prefer to visualize open mode as searching a trunked system for any transmission, regardless of talk group.

You can lock out conventional channels so they won't be scanned. You can lock out talk group IDs from being scanned in closed mode, but the PRO-2053 lacks the ability to lock out IDs in open mode.

The PRO-2053 has a single limit search bank, a weather search, and five service search (factory preprogrammed) banks, including Marine, CB, Police/Fire, Aircraft, and Ham. The Police/Fire and Ham services are further subdivided into six and four selectable groups. Marine and CB channel numbers are displayed along with the actual frequency.

◆ Cloning

A 1/8 inch jack on the rear panel can be used to connect two PRO-2053s or a PRO-2053 and PRO-93 portable together to clone

the memory data from one radio to the other. The manual does not document the interface commands that would be required to write computer cloning software. Experimenters have already reverse engineered the port details and have written Windows software to clone either radio.

Too bad Radio Shack doesn't publish the cloning port specifications. That would make it easier for people to develop software and make the PRO-2053 more attractive to hobbyists who use Mac and Linux computers.

◆ Performance

The PRO-2053's audio is better quality than the average desktop scanner when using the internal, top mounted speaker. The squelch has little hysteresis and an acceptable tail. The display is easy to read and the contrast

is adjustable.

Measurements

Radio Shack PR-2053 Scanner

S/N C000217, Date code 07A01,
Firmware Version 1.00
List price \$249.99
Radio Shack, Inc.
Ft. Worth, TX 76102

Frequency coverage (MHz):

25 - 54 (5 kHz steps)
108 - 136.9875 (12.5 kHz steps)
137 - 174 (various, factory selected steps)
216.0025 - 225 (5 kHz steps)
408 - 512 (6.25 kHz steps)
806 - 823.9875 (6.25 kHz steps)
849 - 868.9875 (6.25 kHz steps)
894 - 960 (6.25 kHz steps)
1240 - 1300 (6.25 kHz steps)

Modes: AM, NFM, user selectable

Intermediate Frequencies:

Approx. 380.8, 21.4, and 0.455 MHz

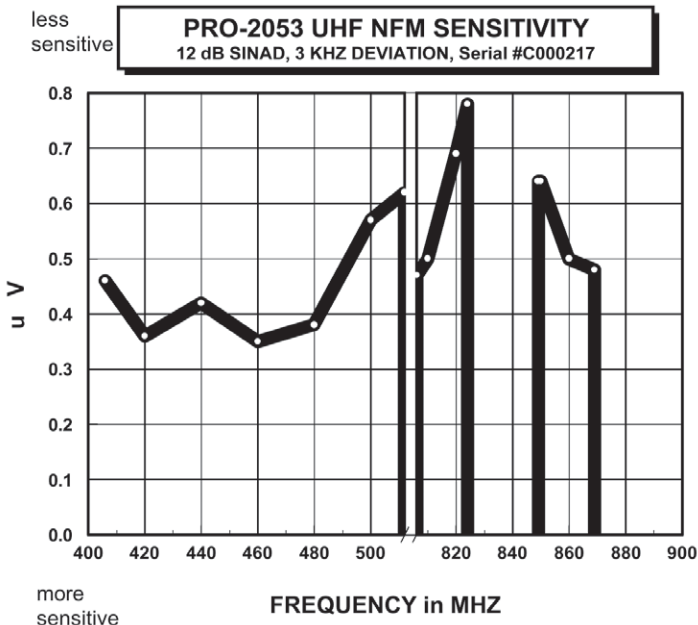
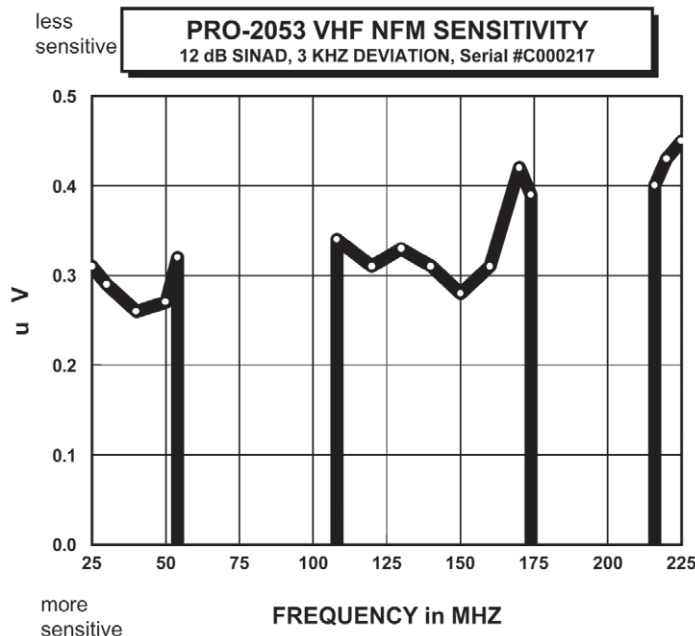
Image rejection due to 1st IF:

61 dB at 40 MHz
41 dB at 155 MHz
59 dB at 460 MHz

Audio output: 0.97 W @ 10% distortion

Squelch tail: moderate

Practical memory scan speed: 52 channels/sec.



Our PRO-2053 experiences some intermod on the VHF air band due to a mixture of a strong 162.4 MHz weather radio transmitter and other transmissions.

The sensitivity is fairly good below 894 MHz. Though we didn't graph the results above 894 MHz, we measured an FM sensitivity better than 0.5 uV for 12 dB SINAD from 894 to 1300 MHz.

We measured a zippy 52 channels/sec scan speed. That is more than twice as fast as our PRO-2067 and the fastest of any GRE-made model we've tested so far.

The PRO-2053 is a very good alternative to the PRO-2067 if you don't require CTCSS or DCS squelch, LTR trunking, or more channels. Download the owner's manual at <http://www.radioshack.com> for more information.

◆ More Serial Ports

Two trends are on a collision course. More radios are being offered with serial data ports at the same time as computer manufacturers are offering fewer RS-232 serial ports on their new computers. The computer companies have been replacing RS-232 serial ports with USB ports, but radio manufacturers have ignored the trend.

Serial-to-USB converters are available but are often incompatible with scanner software. What can you do? You can add an external port switch that permits a serial port to be shared among several radios, one at a time.

What if your computer has only a single serial port and it is being used by your dialup modem? You can install a multi port circuit card inside the computer cabinet. Modern cards plug into a PCI slot.

We installed a \$30 CompUSA PCI High Speed Serial and Parallel Port Adapter card (SKU 271773) and gained two extra RS-232 serial ports and one extra printer port (fig. 2). A 25-pin parallel port connector and a 9-pin serial port connector are mounted on one panel, and a separate panel holds the second 25-pin serial connector. The additional serial port connects to the card by a ribbon cable, though the minimalist instructions don't show it.

The new ports on CompUSA's card share a single IRQ so it doesn't gobble many resources. NetMos Technology makes the chips on the card. The version 1.0 driver software furnished with our card

caused problems, so we downloaded newer software from the NetMos Technology web page and the card is working well under both Linux and Windows 98SE.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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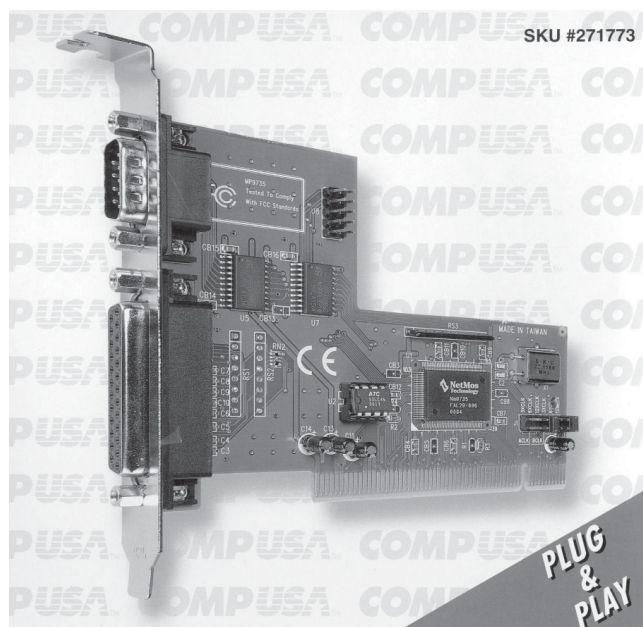


Figure 2: CompUSA PCI high speed serial and parallel port adapter

Spyware

What Is It? Are They REALLY Doing That?

What You Can Do About It!

In the annals of history it will be recorded that sometime in the 21st century civilization evolved the information super highway to reach virtually all people on Earth. For the first time since the beginning of time, instant access to all the knowledge that mankind had learned and discovered was available to everyone on Earth, without discrimination. Also, as a result of the tiny, super high data rate “personal and media communicators (PMCs)” that everyone was given at birth, everyone shared world events, meetings, new discoveries, inventions and knowledge as they happened. All information was available to everyone. No longer did the old adage “Information is power” apply to the people of Earth.

If you think this sounds like science fiction, think again. Although PMC’s are not yet a reality, the basic information transfer infrastructure is in place and developing rapidly. It all sounds like a step in the right direction for mankind. However, once again the duality of humanity rears its ugly head. At the same time that we begin to glimpse a future where information is equally available to all, the technology already exists for people to acquire your personal information without your knowledge or consent.

◆ How private is my computer?

When we log onto the Internet, a so-called primary channel is established. The website we are accessing via the primary channel is displayed on our location bar. But always remember that the Internet provides two-way communications. So we are not simply downloading data from the website. Many websites give and take data from your computer in the form of cookies. These are small files that are created and stored on your computer by some of the websites that you have accessed. You can see what cookies have been cre-

ated on your computer by going to the Windows directory and then opening the Cookies folder.

Your cookies can be read by a site which you access without your explicit permission if you have selected the “Accept All Cookies” in your web browser. This is sometimes the default setting after browser installation. Check your browser’s Help file to see how to turn off your cookies if you want more privacy.

But there’s another level of invasion of privacy, of which spyware is one example; it has the potential of being much more damaging without your knowledge or control ... until now.

◆ What is spyware?

We have all heard of viruses and worms, which silently enter our computers and destroy data. Spyware, on the other hand, is as stealthy, entering without our knowledge or authorization. Once in our system spyware operates in parallel with our primary Internet channel, sometimes referred to as the backchanneling. Here it has the potential of sending all sorts of data and personal information to the originating website.

Spyware captured data can include sending our keystrokes, thereby completely undermining the security of our passwords. Since the actual keystrokes are recorded, all forms of data encryption are useless. Spyware can also be used to scan our computer’s directories for specific data files and then transmit the file(s).

Keep in mind that all this occurs without our knowledge while we think we are just “monitoring” the Net! In late 2000 the US government began to take notice, and legislation was considered to make the use of spyware by software manufacturers and others, a criminal offence. See <http://grc.com/spywarelegislation.htm> for details. Please note I have not checked the story for authenticity.

A website that monitors spyware-tainted programs and sites <http://grc.com/optout.htm>, lists known and suspected applications containing spyware.

Some software companies maintain that spyware has a legitimate marketing research purpose. I’m sure we all would like the opportunity to decline being part of any study – market or otherwise. In other cases we may choose

to allow sharing of certain data with others. But in this case what we have agreed to share should be clearly stated and then limited to just those files.

There have been reports of some very popular freeware and shareware programs, which ask the user’s permission to share specific files, but then go well beyond those defined files. A popular MP3 sharing site was cited in a monthly publication for containing spyware.

◆ What’s to be done?!

Well, if you tried to download OPTOUT from one of the above sites you’ve found out that this spyware killer program is no longer available. But don’t give up hope. Lavasoft’s Ad-Aware is now available at <http://www.lsfileserv.com/index.html> as a free download (You can also try <http://lavasoftUSA.com>). This program was originally produced to remove static advertising banners from screens. However, after it was discovered that some of these banners also carried spyware, the program was updated to address the spyware. Ad-Aware will scan your directories and look for files that have a characteristic spyware operation. It will then list these potential spyware candidates and allow you to select which ones to delete.

◆ READ THIS BEFORE RUNNING

Ad-Aware checks for certain known spyware programs and modules that use a backchannel connection. However, remember that spyware is unauthorized sharing of data. Ad-Aware cannot differentiate between authorized and unauthorized sharing programs. Look very carefully over the potential spyware list that is generated before you delete them. You can cause authorized sharing programs to stop operating if you are not careful. Okay, you have been warned.

◆ Using Ad-Aware

Nothing could be simpler. The 800-K file takes a bit of time to download over a dial-up connection. However, installation is very fast and easy, and in a minute you will be greeted by Ad-Aware’s main screen, Figure 1.

You then choose what you want scanned at the left side of the screen. You will see I’ve chosen Scan Registry (Quick and Deep scans) and Scan Drives (C and D). The time required for these actions to be completed is dependent upon your system’s speed and the amount of occupied drive space. See Figure 2.

Finally, if Ad-Aware has found any poten-

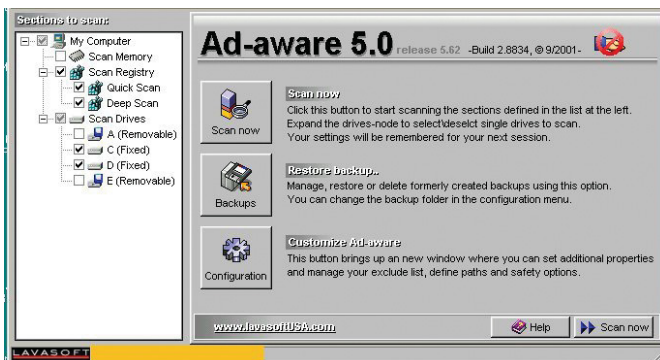


Figure 1 – Ad-Aware Main Screen

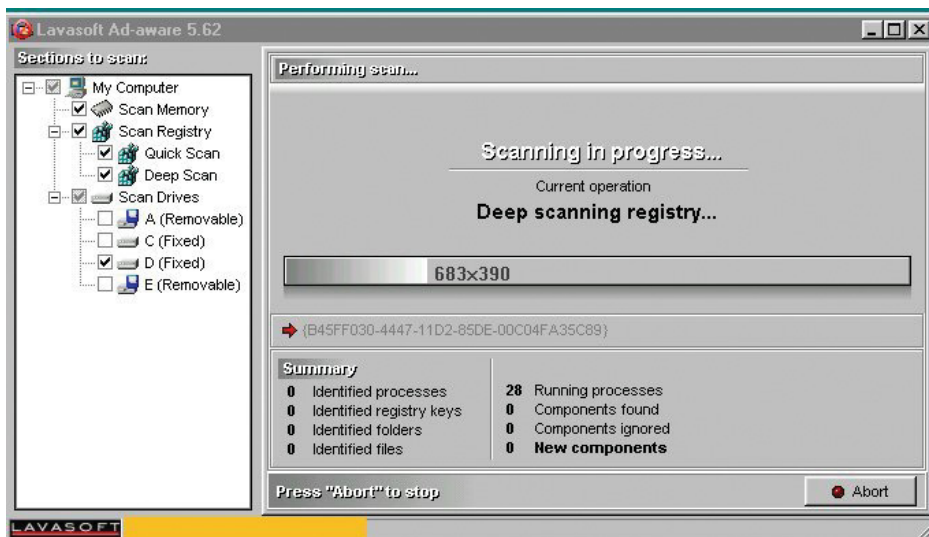


Figure 2 – Ad-Aware Doing Its Thing

tial spyware, a screen will be displayed listing them. Here, by clicking the box to the left of the file name you can chose to selectively delete files. Each time you run Ad-Aware the program keeps a dated log of its actions in plain text format that is stored in your Ad-Aware folder.

◆ My results

My first run of Ad-Aware produced a list of

eighteen (18) potential spyware programs! The list was very interesting, since some resided in my Windows/Cookies folder, Windows/System folder, Internet Explorer folder and Netscape Communicator Plug-ins. Other spyware candidates were dispersed throughout a number of downloaded flight simulator add-on files!

I chose to delete them all and have yet to discover a program that no longer runs.

Washington Whispers continued from page 4

tional security systems from frequency interference while allowing commercial deployment of new technologies.

The Commission admitted the rules may be overly protective and pledged to conduct its own testing and monitoring of UWB products that come to market to ensure there isn't any interference.

◆ UWB applications approved

Mostly used now by the U.S. military, ultra-wideband allows for wireless communications and accurate readings of location and distance that have a wide range of applications. The FCC put severe restrictions on UWB devices operating in the crowded radio frequencies below 960 MHz. Only ground-penetrating radars used by mining companies and public safety and scientific research firms can operate at that level. Here is a recap of the UWB Order.

Imaging Systems:

Provides for the operation of GPRs (ground penetrating radars) and other imaging devices under Part 15 of the FCC rules subject to certain frequency and power limitations. The operators of imaging devices must be eligible for licensing under Part 90 (Private land mobile radio services), except that medical imaging devices may be operated only by a licensed health care practitioner. At the request of NTIA, the FCC will notify or coordinate with NTIA prior to the operation of all imaging systems. Imaging systems include:

Ground Penetrating Radar Systems:

GPRs must be operated below 960 MHz or in the frequency band 3.1-10.6 GHz. GPRs operate only when in contact with or within close proximity of, the ground for the purpose of detecting or obtaining the images of buried objects. The energy from the GPR is intentionally directed down into the ground for this purpose. Operation is restricted to law enforcement, fire and rescue organizations, to scientific research institutions, to commercial mining companies, and to construction companies.

Wall Imaging Systems: Wall-imaging systems must be operated below 960 MHz or in the frequency band 3.1-10.6 GHz. Wall-imaging systems are designed to detect the location of objects contained within a "wall," such as a concrete structure, the side of a bridge, or the wall of a mine. Operation is restricted to law enforcement, fire and rescue organizations, to scientific research institutions, to commercial mining companies, and to construction companies.

Through-wall Imaging Systems: Must be operated below 960 MHz or in the frequency band 1.99-10.6 GHz. These systems detect the location or movement of persons or objects that are located on the other side of a structure such as a wall. Operation limited to law enforcement, fire and rescue organizations.

Medical Systems:

These devices must be operated in the frequency band 3.1-10.6 GHz. Medical imaging systems are used to "see" inside the body of a person or animal. Operation must be at the direction of, or under the supervision of, a licensed health care practitioner.

◆ Immediate benefits – time

The most obvious benefit of the whole operation is that my boot-up and my Internet connect times have been cut significantly, almost in half. I ran Ad-Aware on two other systems with the same reduction in boot-up times.

◆ Ooops!

Ad-Aware provides a feature which restores previously removed spyware that has been backed-up during removal. This is available from the main screen, Figure 1, at the bottom right. I have not yet tried this function.

◆ Summary

Philosophers through the ages have said, "There is nothing in our material world that is only good." No matter what our initial intentions are, things can be misused. Fire is a simple example. Fire allows us to cook our food, keep our families warm and propel vehicles. However, fire, if misused, can result in horrific devastation and destruction. Fire knows no good or evil. It is how we choose to use it that defines its "character."

In the 21st Century, PMCs are not yet a reality. However, computer communications programs and their evil spyware, are. Be careful out there! Till next time.

Surveillance Systems:

Although technically these devices are not imaging systems, for regulatory purposes they are treated in the same way as through-wall imaging and will be permitted to operate in the frequency band 1.99-10.6 GHz. Surveillance systems operate as "security fences" by establishing a stationary RF perimeter field and detecting the intrusion of persons or objects in that field. Operation is limited to law enforcement, fire and rescue organizations, to public utilities and to industrial entities.

Vehicular Radar Systems:

Provides for the operation of vehicular radar systems in the 24 GHz band using directional antennas on ground transportation vehicles provided the center frequency of the emission and the frequency at which the highest radiated emission occurs are greater than 24.075 GHz. These devices are able to detect the location and movement of objects near a vehicle, enabling features such as near collision avoidance, improved airbag activation, and suspension systems that better respond to road conditions.

Communications and Measurement Systems:

Provides for use of a wide variety of other UWB devices, such as high-speed home and business networking devices as well as storage tank measurement devices under Part 15 subject to certain frequency and power limitations. The devices must operate in the frequency band 3.1-10.6 GHz. The equipment must be designed to ensure that operation can only occur indoors or it must consist of hand-held devices that may be employed for such activities as peer-to-peer operation.

Getting Started in SW Listening - Part 3 Antennas, Accessories, and Niche Listening

By Ken Reitz KS4ZR

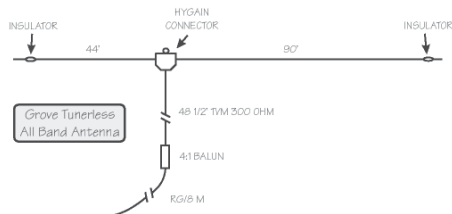
Once bitten by the shortwave listening bug, you'll never be satisfied until you've done everything in your power, physically and financially, to be able to hear everything there is on shortwave. And that's saying something, because there are dozens of monitoring niches for you to explore. Most SWLers listen to a broad range of signals, but many specialize in certain types of monitoring such as pirate radio broadcasters, numbers stations, utilities, amateur radio stations, digital modes, QSL collecting, beacons, and more.

However, to increase your chances of improved reception you may need to make some additions to your listening post. Here are some things to consider adding: An external antenna, a signal filter/processor, and a computer interface.

♦ Antennas for All Occasions

The radio art is just one hundred years old and there are probably thousands of antenna designs which have been used throughout the course of the century. Over the years, though, a few have stood the tests of time, technology and solar cycles. While there's not a single antenna which can be truly called the perfect antenna, there are a couple which have proven to be good performers for certain bands. (See the recent series in *MT's Antenna Topics* column for more.)

One that I've had much success with as a ham and an SWLer is the Grove Tunerless All Band antenna (see drawing). Designed by *MT's*



Bob Grove, this antenna is an excellent receiving antenna for the entire high frequency (HF) spectrum (1.8 MHz to 30 MHz). It's based on numerous other successful HF antennas and has all the qualities one should look for in a great external antenna: 1) It can be easily built even by someone with no experience building antennas. 2) It's relatively inexpensive. 3) It's a low noise antenna. 4) It makes a great transmitting antenna for SWLers who later become

amateur radio operators because it will allow operating without the aid of an external antenna tuner. Its biggest drawback is its size. At 134 feet overall, it may not fit on many suburban lots.

While this antenna works great for all HF bands, for the lower frequencies (AM band and below) more directional and even quieter antennas are needed. That's where another old standard design comes in.

The Beverage antenna was named for its designer H. H. Beverage. It's particularly useful for the lowest bands (150 kHz to 1800 kHz) because it's extremely low-noise and very directional. This is important because the AM band tends to be very crowded. Random signals from all over the country on any given AM frequency make it very hard to single out just one. It also needn't be higher than 10 or 12 feet in the air. However, its biggest drawback is that it requires a vast amount of property. Beverage antennas usually need to be at least one wavelength long and at medium wave frequencies that's huge – on the order of 500 to 1,000 feet long.

A popular AM antenna which doesn't have the drawback of size is the old-time "loop" antenna, which is a fairly small loop of wire or many strands of wire which can be rotated in order to *null* or tune out signals on the same frequency coming from different directions. While not as sensitive as the Beverage, these are very effective AM antennas and take up very little space.

♦ Signal Filters and Processors

One of the biggest improvements in shortwave radio reception in the last ten years has been the introduction of *digital signal processing* (DSP). Radio receivers have always had a certain amount of filtering and signal processing built into the internal circuits, but outboard DSP filters can improve virtually any radio's reception. For casual shortwave listening there's no need for a DSP filter, but for serious DX listeners trying to dig out weak signals on

crowded bands a DSP is a real help.

There are a number of filters and processors available on the market. Generally speaking, the less expensive a signal processor is, the less it will probably do. I advise you don't pay more for a DSP than your radio. While a good DSP will definitely improve your reception it can't work miracles. Some processors are simply audio filters which serve to accent certain frequencies and "roll off" other frequencies in the audio in order to clarify what you hear. These are marginally helpful in light interference.

If you are trying to dig out nearly unlistenable signals from a crowded band, you'll need a tunable DSP such as the MFJ 784B (see full review in March '00 *MT*). With an incredible array of filter adjustments at your fingertips, you can quickly tune out interfering signals by simply turning the front panel knobs to the mode you're trying to hear. By adjusting for lowest noise and strongest signal you can tune Morse code (CW), radio teletype (RTTY), weather facsimile (WEFAX), slow scan TV (SSTV), HF packet and voice at signal levels you couldn't otherwise copy. Expect to pay \$250 for the MFJ-784B.

♦ Radio Computer Interfaces

To receive the digital modes mentioned you'll need another accessory: the radio/computer modem. It's one of the most exciting things to happen in shortwave listening in a long time. When first introduced these products had limited capabilities, were extremely expensive, and quickly fell out of date with the continued upgrading of microprocessor technology.

Today such devices as the Tigertronics BP-2M (see full review Dec. '99 *MT*) are available and relatively inexpensive (\$70). By merely attaching the interface to your computer's COMM port and plugging the other end into your radio's speaker jack, the interface can decode many popular digital modes. Software for such a device comes with the product. Additional software and updates are available on the Web.

It's possible to "homebrew" your own interface or take advantage of the capabilities your computer's on-board soundcard may have for receiving digital modes, but be aware that results might not be as satisfactory as with commercially produced interfaces. Still, no matter how modest your computer or shortwave radio is you can "see" the action on the bands with



MFJ-784B Tunable DSP Filter helps separate signals on crowded bands (courtesy MFJ Enterprises)

fairly simple equipment. And, if you're looking for even more esoteric mode reception you can find that, too, but be prepared to pay \$500 to \$1,500 for the gear and software.

◆ Finding Your Niche in SWL

For most people, starting out in shortwave listening is the same: you want to listen to distant radio stations from foreign countries, and hear music and voices from other lands. There's a thrill in being able to receive a signal from a radio station halfway around the world. But, like most, you won't be satisfied with just hearing the big international broadcasters; you'll soon find a passion for other aspects of the hobby. As you will shortly discover, proponents of every facet of medium wave (AM) and shortwave monitoring can be nearly fanatical about their pursuits. So, here are some really interesting places to start.

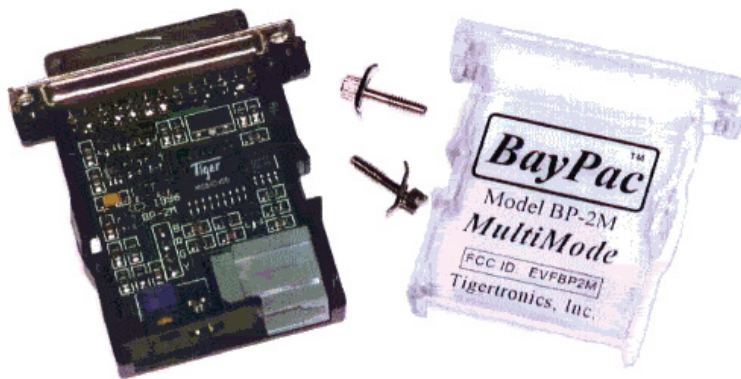
*** Low Band DXing.** This is the area below the AM band where the antennas are strange, the band conditions normally bad, and the listening targets are weak signals of esoteric origin. You can follow the action in the "Basement Band" in Kevin Carey's monthly column *Below 500 kHz in MT*.

*** AM Band DXing.** New FCC rules and a greater number of AM stations have turned this band into nighttime audio chaos. Advances in receiver technology, signal processing and antennas make it possible to listen to America any night of the year. Catch Doug Smith's *American Bandscan* in each issue of *MT* for tips and latest news.

*** Tropical Band DXing.** As you might imagine, atmospheric conditions in the tropics throughout much of the year are terrible. That makes the AM band nearly useless for domestic local broadcasting in many countries which lie between the tropical lines on the globe. These areas use the frequencies between 2300-2400 kHz, 3200-3400 kHz and 4750-5060 kHz. The *MT* Shortwave Guide will help with frequencies and times of English broadcasts. However, for Spanish broadcasts, the most common in this hemisphere, you will need World Radio TV Handbook or Passport to World Band Radio.

*** Pirate Broadcasting.** Eschewing government authorization, these unlicensed broadcasters cluster around 6955 kHz +/- 10 kHz using bogus IDs and playing an assortment of music and scripted comedy. Catch them if you can. Their transmissions are often short, funny parodies of the shortwave bands themselves. It's insider radio humor at its best. Read more about pirates in George Zeller's *Outer Limits* in *MT*.

*** Numbers Stations.** Relics of the height of



Tigertronics Modem Interface adds a visual dimension to your radio listening (courtesy Tigertronics)

the Cold War, these stations are said to be sending coded messages to operatives in the field by way of these "spontaneous" transmissions. Often a female voice in Spanish enunciating numbers in groups of 5, these messages come and go mysteriously. It's been spook-filled fun for the last 40 years.

*** Utility or "Ute" DXing.** The world's governments, official and clandestine, keep the airways humming in between the traditional shortwave broadcast bands with streams of military, diplomatic and general government radio traffic. You can also hear South American drug smugglers en route, Coast Guard vessels trying to find them, Russian language taxis, North Atlantic fishermen, and even Air Force One. Who needs TV? Hugh Stegman's column *Utility World* has a two page list each month in *MT* of recent loggings.

*** QSL Collecting.** QSL is ham Morse code short hand for "verification of transmission." Most shortwave broadcasters will send you a QSL card verifying reception of their signal if you send them a detailed report of what you heard and when you heard it. It's not as easy as it sounds. Many small countries are strapped for funds and may not send a QSL card unless you send a self-addressed return envelope with *International Reply Coupons (IRCs)* enclosed. It can also take weeks or months for a reply. Details on the art of QSLing are found in Gayle Van Horn's *The QSL Report*.

◆ But Wait, There's More!

Once you get hooked in the shortwave listening hobby, you may never be able to leave. There's an entire group of people devoted to reclaiming old broadcast radio sets. You'll find famous old names like RCA and Zenith and famous forgotten names like Stromberg-Carlson and Atwater-Kent. Great old radios play again from every era of the broadcast industry from crystal sets to the first transistors thanks to the ingenuity and efforts of the folks in this end of the hobby. (See *MT's Radio Restorations* column.)

There are people who study the atmosphere and the solar cycle to try to forecast DX conditions in the next couple of days or weeks or at least try to explain why band conditions are the way they are right now.

You can hear amateur radio operators conversing, conducting nets, running contests, or even aiding in public safety or search and rescue operations. (See the *On the Ham Bands* column.) You can hear amateur radio satellites as they streak across the sky 200 miles over your house. (Listen between 29.300 and 29.500 MHz, but remember they're only in range for 10 or 15 minutes.)

You can tune into radio stations all across the HF spectrum and find *Time Signal* stations. These are government-run automated transmitters which tell

the time 24 hours a day. It's a good way to test your receiver and antenna's capabilities. There are also low power beacon stations transmitting 24/7 on specific frequencies which help you know what bands are open to what areas of the world. A list of time signal propagation beacons can be found at <http://www.scn.org/IP/nwqrp/archives/misc/beacon.html>.

Here are three other sources for links to hundreds more AM and SW DX web sites and dozens of topics on this subject:

<http://www.dxing.com>
<http://www.dxzone.com>
<http://frn.net>

You may never have imagined the incredible variety of signals which are available to you when you first bought your shortwave receiver. But, you do now!

Performance Upgrades

Kiwa offers performance upgrades to improve the performance of the following receivers:

AOR AR7030
 CC Radio
 Icom R71 R75
 JRC NRD 525 NRD 535 NRD 301A
 Lowe HF150 AP/SP150
 Radio Shack DX390/392 DX394 DX398
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Audiovox's FRS-1000 Base Station

What has happened to Family Radio Service radios reminds me a lot of the history of digital watches. When they were first introduced back in the 1970s, watches with numbers instead of hands were fabulously expensive because they were unusual and few companies were making them.

But as time went by, the cost of digital watches dropped and dropped until just the other day I found one included, as a freebie, with a box of my son's vitamins. FRS radios haven't quite gotten to where they are given away with Happy Meals, but the price certainly has dropped. When they were first introduced FRS radios generally cost around \$150 each. Most recently, I saw a pair of FRS handtalkies at a local discount store for just under \$40 for two of them in a blister pack.

Despite all that, and despite being involved with FRS for several years now, I was a little surprised at what happened next. I was wandering through my neighborhood "StuffMart" when one of the little guys who runs the filing room in the back of my head piped up with a message: "Isn't it about you found something to review for *MT* this month?" "Yeah," chimed in his crabby assistant, "You said you would do it last week, and ya haven't. So get on the stick, will ya?"

To get them off my case, I strolled over the electronics department to see if there was anything worth writing about. Gadzooks! Right in front of my eyes was a large blister pack bearing the lettering: "Audiovox FRS Base Station."

Base Station! Suddenly I flashed back to my days as an 11-meter cowboy. "That's a big 10-roger, Lizard Hips, we'll catch ya on the flip-flop. Mercy sakes, keep the shiny side up and the dirty side down."

But this was not that kind of base station. No, the package before me featured a photograph of a woman in the kitchen pressing a button on a grey box about the size of a telephone that had a six-inch black antenna sticking up from one side. "It's Mom calling the kids," I thought.

So, to cut to the chase: there really is a Family Radio Service base station, and it works extremely well.

◆ Features

To start, the Audiovox FRS-1000 looks like no other FRS unit I've seen. Made of gray plastic, it is designed to lay flat on a desk, table or counter. It measures 4-5/8 in. wide by 6-7/8 in. long by 2-3/8 in. deep. It is capable of transmitting and receiving on the 14 Family Radio Service channels:



Channel	MHz		
1	462.5625	8	467.5625
2	462.5875	9	467.5875
3	462.6125	10	467.6125
4	462.6375	11	467.6375
5	462.6625	12	467.6625
6	462.6875	13	467.6875
7	462.7125	14	467.7125

In addition, the FRS-1000 can also receive weather broadcasts on 10 weather channels (* indicates Canadian maritime channels):

Channel	MHz		
1	162.550	6	162.500
2	162.400	7	161.525
3	162.475	8	161.650*
4	162.425	9	161.775*
5	162.450	10	163.275*

The FRS-1000 is also equipped with a bunch of other goodies, including weather alert capability, 38 CTCSS (continuous tone-coded squelch system) codes for blocking reception of unwanted transmissions, voice-activated transmission, wall wart transformer, rechargeable back-up batteries, roger beep end-of-transmission tone, dual watch, channel and tone code scanning, call button and high and low transmit power levels (.5 watt and .15 watt).

At the upper right corner of the front panel is a liquid crystal display with information about the status of the FRS-1000. Immediately below

the LCD are three light emitting diodes: one that lights when transmitting; another that indicates the weather alert mode has been turned on, and another that shows when the back-up batteries are charging.

In the middle of the panel's face are nine buttons. In the first row, there are a pair of Up/Down buttons that are used to change channels, activate and chose CTCSS tones and a variety of other functions; and an ALT button that turns on the weather alert. In the second row there are: VOX button for voice-activated transmitting; Mode for selecting a variety of advanced functions, and L/Mon for turning on the light and defeating the auto-squelch. In the third row, you'll find a Scan button for scanning, WX for weather reception, and a power button. Below these nine buttons are the Call and Push-To-Talk buttons.

At the left side of the buttons is a grill for speaker and microphone, and at the top left side of the case is an antenna that measures six inches long. On the bottom of the case is a hatch for installing the back-up batteries, a couple of non-skid feet, and a pair of holes that allow the FRS-1000 to be attached to a wall in a vertical orientation if desired. On the top edge of the case is a switch for activating the battery charger and a jack for the wall transformer power cord.

Clearly, this is a unit that is designed to function as "communication central" for a household. The FRS-1000 sits on the kitchen counter, perhaps, and the kids in the yard and Dad in the garage carry FRS handi-talkies on them. When dinner is ready, it's time to go somewhere, or there is a phone call, a press of the PTT button and a few words saves yelling out the back door. I could also see this unit being used by a variety of groups for communication around a facility. The beauty of the FRS-1000 is that it "lives" in one spot where everyone can find it, and it never runs out of batteries.

◆ Our Test

But how is the performance? I'm glad you asked: the audio on transmit is outstanding and the range is absolutely the best of any FRS unit I've tested. The weather receiver seems to work just fine. The only glitch is that the audio from the small speaker on receive isn't as crisp as it could be, although it is very "copyable" (and there is provision for an external speaker).

The bottom line: if the idea of a base FRS station/weather radio combo appeals to you, I give the FRS-1000 my hearty recommendation. The suggested retail price is \$69.99, but my local store had them for less than \$35.00.

MT



REVIEW

Quebec Radio-Scanner CD

Review by John David Corby, VA3KOT

Canadian scanning hobbyist and ham radio operator Gilles Thibodeau (VE2KGF) hails from the town of Lac-Mégantic in Quebec. He has produced an information-packed volume of scanning and ham radio related information presented on CD-ROM. Long-time *MT* readers may be familiar with Gilles' name. He was the author of a book on scanning published between 1989 and 1991 that was reviewed in *MT*.

Gilles got started in the hobby in 1980 with a Bearcat BC210 scanner. He told *MT* that, at first, he didn't have much idea of what to do with his scanner. However, he quickly became an enthusiastic proponent of the hobby. Researching information on microfilm at the Canadian government's Department of Communications he was able to assemble enough data to eventually become somewhat of an authority on the subject. Gilles went on to assemble a comprehensive library of radio modification information and six months ago he started work on producing his latest work.

This CD has a modest appearance, but inside its folders you will find a wealth of information for both hams and scanner owners. The target readership for this latest volume is the Quebec market in French-speaking Canada, although Gilles makes a courageous attempt to appeal to French and English speakers alike.

No matter what aspect of the hobby appeals to you, you will find something of interest. For

example, if you are an aviation enthusiast you will find the section on ACARS useful. A copy of the program "KRACARS" is included on the disk. Using this software, scanner owners can decode the data transmitted by aircraft transponders.

A large selection of "10 codes" is included for the Province of Quebec emergency services. There doesn't seem to any standard for 10-codes in Canada, so it is important to have a reference table for the less common codes used over the air.

The shareware section includes various programs for CW operation, DTMF decoding, EDACS, and computer control of AOR and Uniden radios. I was a little disappointed that the shareware collection seems to be a random selection of titles; it could have been more comprehensive and a little better organized. I would have liked to see sub-folders with the programs organized by category. Perhaps Gilles will consider this option in future releases.

I particularly liked the electronic circuits section. Unlike many hobbyists today, I remain a dedicated home-builder of everything elec-

tronic. The selection of circuits will appeal mostly to hams, but there is a little something for everybody here. There is even an electronic catalog for a popular brand of semiconductors on the disk.

Tow truck operators and emergency services monitors will find the section on trunked systems very valuable. The section includes the program "Trunker" as well as several fleet maps and data signal audio samples to aid in recognized the trunking system in use.

The main feature of the CD is the frequency database.

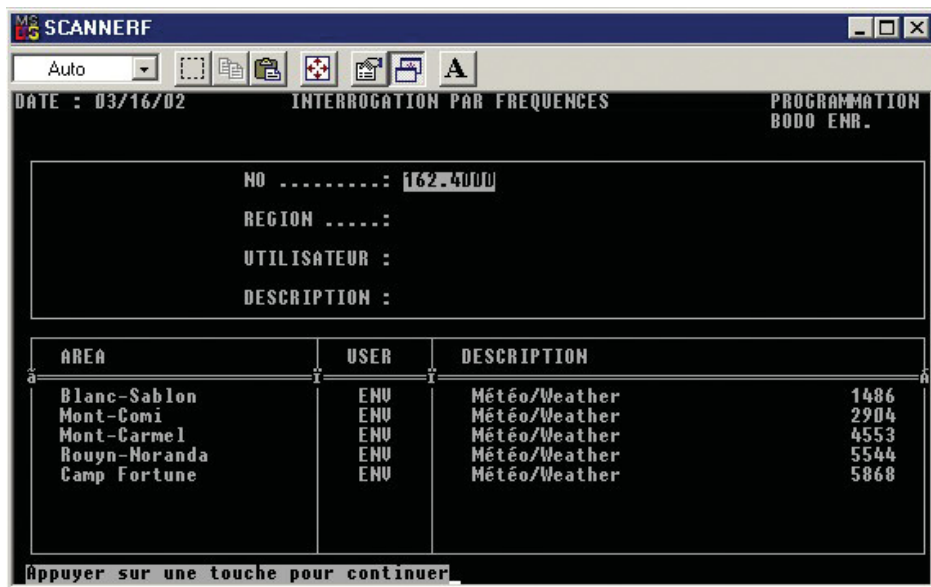
Over 14,000 frequencies are listed covering emergency services, Quebec provincial and federal police forces and trunking systems. Files are in DBF format and can be searched using the enclosed software, or imported into commercial software supporting the DBF file format. The utility provided on

the CD is a fast and simple executable that runs from the CD without any installation. However, the menu is in French, and the appearance of the simple DOS-window begs elegance (see illustration). I imported the database into Star Office in seconds and found it easier to review in that format.

Since the Province of Quebec shares a border with Vermont in the United States, the author has thoughtfully provided a substantial section of frequencies, graphics and other useful information related to Canada's friend and neighbor to the south. This section is surprisingly comprehensive. It covers New England states near to Quebec and includes aviation, emergency services, military and even secret service frequencies!

The CD is available by mail order for \$35 in Canadian funds. The price includes shipping within the Province of Quebec. For orders outside of Quebec, please contact Gilles by e-mail at ve2kgf@globetrotter.net, or the old-fashioned way at:

Gilles Thibodeau
C.P. 193
Lac-Mégantic
Quebec, G6B 2S6
Canada



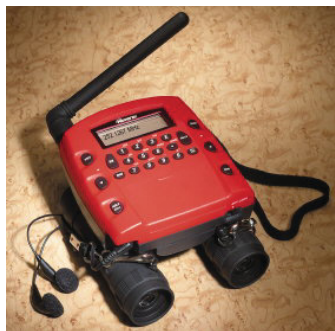
Screen capture of the frequency database lookup utility

What's NEW

Tell them you saw it in *Monitoring Times*

The Best of Both Worlds

Want to enhance your sports listening? An unusual gadget that's been around a couple of years just caught our attention. It also gave us some amusement, even though it has legitimate applications for auto racing and other sporting events, especially if you're seated in the nose-bleed section. The Memorex Scannocular combines a pair of 8x25 binoculars for viewing the action, with an FM- and TV-audio receiver and scanner to listen to the play-by-play via earbuds.



Although we couldn't find frequency coverage listed for the scanner, it's touted by some web sites for NASCAR monitoring, so coverage includes UHF at the least. It also features 10 preset service categories, 100 programmable scanner channels, 800 MHz coverage, and weather channel scan. Mini-jack earphones and a right-angle duckie antenna are included.

As a novelty item the Scannocular (MSB1003) may not be as widely available as when first promoted, but you can still get them for \$129.99 from Memorex. Just call 877-679-6262 or visit <http://www.ememorex.com> to order.

Meanwhile, Uniden is doing its best to come up with something new for the race car fan. It's working on a racing scanner that includes telemetry readings such as lap times, engine speeds and other real time data. The scanner was introduced at the CES show, but isn't expected on the market until the 2003 season.

Have a Blast!

In the Radio Equipment column, mention is made of connect-

ing your radio to a computer to make use of digital decoding, channel uploading, logging, etc. Westmountain Radio makes it easy for hams to connect with their RIGblaster interface which goes between the mic jack and the computer sound card. RIGblaster costs between \$109.95 to \$139.95; an even less expensive version (the nomic), for folks who rarely transmit, is currently on back-order.

With RIGblaster you may operate using any ham radio sound card software. Westmountain Radio even provides a CD of all available software, free with purchase of a RIGblaster, or at cost if purchased separately (around \$9). Version 5 of the CD has just become available. Much of the software can also be downloaded from their website <http://www.westmountainradio.com/index.html>, but the CD is great if you have a slow connection speed.

Westmountain does not support the software, nor do they sell it: These programs are freeware, shareware, or demo versions only. Programs are included to operate PSK31, MT63, Hellschreiber, SSTV, RTTY, AMTOR, Packet, APRS, WSJT High Speed FSK meteor scatter, CW High Speed meteor scatter, FM repeater announcements, simplex or duplex repeater control.

The CD also includes operating tips with audio recordings of the sounds of all the modes. Other extras include VE2DBE's Radio Mobile 3D color terrain and radio propagation mapping program, with maps of the entire East Coast included; and EA6VQ's VQ Log — primarily a VHF DXers logging program but "there is nothing it doesn't do." Most of the programs are Windows applications with a few for DOS, Linux and Mac.

You can order directly from their web site or write West Mountain Radio, 18 Sheehan Avenue, Norwalk, CT 06854 (Phone 203-853-8080)

Push the Panic Button

Following the events of September 11, 2001, a new company

was formed claiming development of the world's first wearable, selective panic button based on GPS (Global Positioning Satellites). According to GuardianLion TM Corporation, the emergency panic button device will be worn like a pager. The device has three buttons, one for calling the police, one for the fire department, and one for the paramedics. The buttons are recessed to avoid accidental activation. The device uses GPS to send your location (longitude/latitude) information when you press one of the panic buttons, allowing emergency services to automatically locate you within a 5-meter area — something a 911 call from most cellular phones can't yet do!



The company's website provides minimal details. The website says the product was originally conceived as a way for parents to know the whereabouts of their children by consulting a special screen at the company's website. Or if a panic button is pushed, it no doubt alerts GL operators, who would see GPS information displayed using computer software. Depending on the product, we assume GuardianLion dispatchers would then relay the message to the parents and/or the appropriate emergency service.

The GuardianLion emergency button is \$299.95 plus a \$19.95 monthly service fee.

Apparently the security company also offers a full theft recovery package for your automobile. The car is equipped with a GPS device to track the stolen car. "In the event that your automobile has been taken we will dispatch the authorities to the location. Once they are in view of it, if it is being driven we will shut it down via satellite command signal, eliminating

the possibility of a dangerous high-speed chase."

"You can also call and ask us to roll down your windows, unlock your doors, honk your horn, flash your lights and more. This will come in handy the next time you lock your keys in the car or lose your auto in a large parking lot."

For more about this security company and its products, watch <http://www.guardianlion.com> to see if more details are posted, or call toll free to: 1-877-684-0741

Automatic Calling

We reported in the March *Communications* column about the mayor of Los Altos Hills sending out postcards to garner phone numbers and emails in case of a major emergency that required community notification. It turns out that technology for blanket phone calls has been around for a number of years already and is being used by schools, towns, and counties around the country.

It's called the Community Alert Network (CAN), and the system can make up to 15,000 phone calls in an hour. It can relay a pre-recorded message by street, by region, or selected individuals such as town officials. It can be set up to require a password before the message is transmitted or it can even be somewhat interactive by tallying responses by touchtone phone to recorded questions. Besides the annual fee, the cost is 25 cents per completed phone call when activated.

Here are some examples of how CAN has been used: If school is forced to close during the day due to snow, etc, schools can call parents as to when and where to pick up their children as well as broadcasting it over the radio. In 1992, CAN was activated to notify residents of a Louisiana community to evacuate when 3,000 pounds of organic peroxide escaped into the atmosphere from a B.F. Goodrich plant. During Hurricane Andrew in 1992, a parish in Louisiana used CAN to advise residents to boil drinking and cooking water because of contaminated water sup-

What's NEW

Tell them you saw it in *Monitoring Times*

plies. CAN was used to notify area residents following a New Mexico prison escape in 1988.

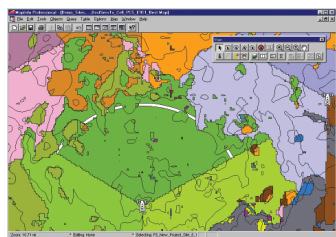
CAN has proposed a \$42 million program to the federal government that would allow citizens nationwide to be notified in case of emergency. The Albany NY company can be found at <http://www.can-intl.com/home.htm>

Putting it on the Map

One key to quick response in an emergency is the ability to process large amounts of information simultaneously. MapInfo has been helping communities do just that for 15 years. Government agencies across the nation are using MapInfo technology for detection, preparedness, prevention, protection, recovery and business continuity:

- o New York Police Department uses MapInfo technology for its next-generation agency-wide crime analysis system, allowing all city agencies to analyze crime patterns by location and frequency for better crime prevention.

- o Federal Emergency Management Agency (FEMA) relies on MapInfo technology for disaster recovery efforts and to determine where to place emergency personnel.



- o Pacific Northwest National Laboratory is prepared to protect the nation in the event of nuclear or chemical warfare with a solution based on MapInfo technology for detecting safe and unsafe areas.

- o MapInfo worked with the Federal Emergency Management Agency and Con Edison at ground zero providing them with visual assessments of the area in order to make good decisions.

Now MapInfo's new Homeland Security software will allow governments and businesses to look

at all aspects of an emergency at once, showing, for example, the roads, phone lines, electrical lines and population of an area all at the same time.

Your Computer is a Snitch

Software that we used to associate with foreign governments or private detectives is increasingly available to anyone who wants to buy it. Programs like **Sneaker** and **Investigator** can record all your keystrokes (thereby accessing your passwords, credit card numbers, etc.), snap pictures from a WebCam, save screen shots, and read your email even if you erased it. Of course, this market has led to other products which detect and remove snooper products. See *Computers & Radios* for a review of one such product – **Ad-Aware**.

Painless Math

The indefatigable George Murphy, VE3ERP, has done it again! George recently released the 58th edition of his HamCalc CD of Painless Math for Radio Amateurs – with its memorable motto, "Aversion to mathematics is not an acquired distaste – it comes naturally."

George's mission in life is to encourage radio amateurs not to be afraid of experimenting or messing about with their radios – at least not for fear of calculations. Collected on this CD are 242 programs which will do the figuring for you on all sorts of radio related projects and other fun stuff.

There are of course, the usual formulas for figuring antenna dimensions for all kinds of antennas – Yagi, loop, helical, J-pole, quad, Windom, stub, G5RV, parabolic, you name it. You can figure the amount of sag in wire antennas, the skin effect or resistance of various metals, or calculate transmission line losses. There's even a formula for figuring the proper length of dryer vent hose to use as an antenna for the band of interest.

The CD includes all kinds of data concerning components used in homebrewing circuits. In addition to the antenna projects, it also

contains many other programs of interest to other hobbyists; for example, UTC and local time zones, harmonic frequency calculator, great circle path, North American TV channels, meteor shower predictors, sunrise/sunset calculator, skip distance calculator, satellite orbit parameters, and more. There's a QRP fox hunt log, a list of helpful checklists, battery schedule log, and even a trip planner, calorie counter, universal perpetual calendar, and financial calculators.

HamCalc is intended for installation in a Windows environment, but once installed, may be run in Windows or in MS-DOS mode. Most programs can be run in either metric or Imperial/US units of measure. Programs are organized alphabetically.

HamCalc has been a labor of love since 1993. George Murphy continues to update programs, add new ones, and produce the CD at his cost plus airmail shipping for only US\$7 worldwide. For more information, email George Murphy at ve3erp@encode.com, or send your \$7 for HAMCALC 58 to George Murphy VE3ERP, 77 McKenzie Street, Orillia, ON L3V 6A6, Canada.

MT in Full Color?!

Subscribers to the electronic *MT Express* discovered a special bonus when they opened their April edition – color photos throughout the entire magazine! One subscriber said, "Just downloaded April *MT Express*. What can I say? Wow! It's amazing what a big difference that little bit of color makes. Great job .. it looks fantastic!" Dave.

MT Express is identical to the print version in content, but it has the benefit of immediate delivery on the 20th of each month, a reduced subscription rate, and now extra color as well. Subscribers to the print version can knock \$8.95 off the \$19.95 price for an even \$11 if they wish to get the benefits of both! Call 1-800-438-8155 or email order@grove-ent.com to start your subscription, or go to <http://www.groveenterprises.com/mtexpress.html> to download a sample copy.

Digital Voice Recorder

Of interest to do-it-yourself broadcasters or anyone producing their own radio programming is Edmund Scientifics' new digital voice recorder, which will store up to 90 minutes of programs, notes, or meetings in 8 MB of Flash Memory. The recorded wav files can be stored in up to three folders of 100 messages each for better management. Best of all, the files can be quickly and easily downloaded to your computer for storage or further manipulation via a high-speed USB port.



The LCD display keeps you informed of important details such as remaining recording time, the date and time, voice activation mode, recording mode and battery status. The DW-90 comes with a microphone stand, earphone, hand strap, "Digital Wave Player" software, and two "AAA" batteries.

The Digital Voice Recorder is \$109.95 plus shipping. To order visit <http://www.scientificsonline.com> or call 800-728-6999.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

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"No doubt about it, the future is here! Sure nice to get the magazine so early, this has got to be the way! Thanks for a great job!"

- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

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By Bob Grove,
Publisher

Is Shortwave Dying? Not By A Long Shot!

With the enormous glut of sophisticated technology now at our disposal – computers, the Internet, satellites, digital communications – many cynics have predicted the downfall of a nearly-century-old mode of communications, the high frequency (HF) spectrum, familiarly known as shortwave.

Starting just above the medium-wave “standard AM broadcast band” (540-1700 kHz), the HF spectrum extends officially up to 30 MHz. Its main claim to fame is its long-range capability, unequaled anywhere else in the electromagnetic spectrum.

It does have its peculiarities – sunspots, electrical storms, long-distance interference, fading, and daily propagation changes all take their toll – but it has always been an inexpensive way to accomplish worldwide communications. And, during emergencies, the HF spectrum comes alive with FEMA, SHARES, amateur radio, Red Cross, military, aeronautical, and maritime interests all exchanging urgent communications, while the international broadcasters alert the world’s listeners.

Although local VHF/UHF short-range communications may provide more reliable 24-hour coverage, satellite constellations offer instant global access, and the wider bandwidths of FM provide better sound quality, only shortwave provides instant, worldwide access using complex modulation schemes, and requiring only one, relatively inexpensive transmitter and antenna.

Billions of dollars worth of radio assets have been in place – and working – for decades. New modulation schemes, automatic propagation polling for optimum frequencies, and other advances have bolstered the use of shortwave as an effective intercommunications medium.

We’re Headed for a Showdown

And now we see a crucial, decision-making conclave forming: the World Radiocommunication Conference 2003, scheduled by the International Telecommunications Union (ITU) for June 2-6 next year in Caracas, Venezuela.

On the agenda are a number of items, including the elimination of the Morse code requirement from amateur license tests, petitions from satellite services to seek more spectrum, and the reassignment of 300 kHz of the 7 MHz spectrum back to the hams on an exclusive basis

after it was taken from them more than 60 years ago.

Hams were awarded 7100-7300 kHz (7.0-7.3 MHz) on an exclusive basis back in 1932 at the Madrid Conference, but in 1938 at the Cairo Conference, a Fascist bloc petitioned to reallocate the band to broadcasters so that they could propagate propaganda. The best that amateur interests could do was to salvage the right to share the band with the broadcasters.

North American amateurs have concerns about the success of their proposal to reacquire exclusive rights to the band. The Radio Amateurs of Canada contingent has submitted a position paper indicating that it “supports the retention of the full 300 kHz allocation to the amateur services in Region 2 (that’s us) while reallocating part of the broadcast service in Regions 1 and 3 (that’s the rest of the world) so as to restore the original amateur band to 300 kHz, exclusive and primary on a world wide basis.”

This proposal is echoed by the entire International Amateur Radio Union (IARU), but the fight will be long and hard. For one thing, Region 2 is the only one that currently shares 300 kHz with the broadcasters; the other two regions have only a 100 kHz amateur allocation.

The broadcasters are mustering their forces, prepared to show that they need additional spectrum for their forthcoming digital services. The maritime service, while admitting their expansion into satellite communications, is unwilling to surrender any of its long-held HF allocations. And the international aeronautical services are planning to expand their HF data communications.

The amateur delegations are willing to settle for new offset bands, like 6900-7200 or even 6800-7100 kHz. While older rigs with their fixed, ham-only frequency sets would be limited, reasonably-recent ham transceivers can be transmit-extended to cover any new assignments.

Next year’s WRC-2003 debate will be heated, with billions of dollars of assets at stake. Clearly, HF communications will continue to be a viable – and well-populated – medium. Will the hams be successful in their bid to reacquire the exclusive 7000-7300 kHz spectrum, or will the onslaught of other contesting interests defeat their bid?

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